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ABSTRACT

One of the problems common to efforts to set skill standards for various occupations is deciding on the facility needed for dealing with the printed word. A similar problem faces those trying to define "workplace literacy." This workbook brings together resources to make them available to those who are trying to deal with this education issue. The following materials are included: (1) "Becoming Literate about Literacy" (Paul E. Barton); (2) "Print Use Profiles" (Judith Shaul Norback); (3) "Literacy Levels for 90 Occupations" (Paul E. Barton); (4) "Reading and Writing Skill Needs in 22 Industries" (Joan Wills); (5) "Elements of Job Literacy" (Judith Shaul Norback); (6) "Different Approaches to Establishing Levels, Scales, and Equivalencies" (Judith Shaul Norback); (7) "Workplace Competencies: The Need To Improve Literacy and Employment Readiness" (Paul E. Barton and Irwin S. Kirsch); (8) "Setting Performance Standards: Content, Goals, and Individual Differences" (Bert F. Green); and (9) "Literacy: Economic Key for the New Millennium" (Richard J. Coley). Most individual articles contain references. (SLD)

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ED 414 310

Occupations and the Printed Word

A Workbook

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INTRODUCTION

One of the problems common to all efforts to set skill standards for various occupations is deciding on the facility needed for dealing with the printed word. A similar problem confronts those trying to define broader "workplace literacy" requirements that are common to all occupations.

We have developed the "workbook" to bring together resources that are scattered around and make them available to people around the country who are trying to deal with this important education issue. The materials provided in this volume are described below:

***Becoming Literate About Literacy,* by Paul E. Barton**

Originally published by the Policy Information Center in 1994, it was designed to be a primer on what was learned from the 1992 National Adult Literacy Study (NALS). It provides the definition of the prose, document, and quantitative literacy scales and describes the proficiency of the adult population. It provides examples of tasks that adults at different levels of literacy are able to perform. It can be used to understand the references to the National Adult Literacy Study (NALS) in the Chapters below.

***Print Use Profiles,* by Judith Shaul Norback of the Center for Skills Enhancement and Garlie Forehand of Educational Testing Service.**

This was written for the Workbook and has not been previously published. Judith Shaul Norback and colleagues have carried out Job Literacy Analyses (JLA) for 29 occupations. They provide detailed examinations of the print materials used on the job. Norback and Forehand have also translated the results of six of these analyses into the five levels of literacy used in the

National Adult Literacy Study. JLA is the most in-depth approach available to establish print-use requirements, and translating this analysis into the NALS levels permits linking to the data base that provides information on the entire adult population.

***Literacy Levels for 90 Occupations*, by Paul E. Barton.**

One way to look at the literacy requirements of occupations is to assess the literacy levels of people working in those occupations. The National Adult Literacy Assessment Study (NALS) permits this for occupations in which the sample size is large enough. This article provides assessment results for about 90 occupations, showing the band (confidence interval) on the Prose Literacy Scale in which the true mean scale score lies. It also provides data for document and quantitative literacy from which to calculate these confidence intervals. While these are the actual literacy levels of real people working in real jobs, we do not know whether their literacy skills are above or below what the jobs actually require.

***Reading and Writing Skill Needs in 22 Industries*, by Joan Wills, Center for Workforce Development.**

This is taken from her 1996 publication, *In Search of Commonalities*, in which she extracts knowledge and skill requirements from the 22 skill standards projects funded by the Federal Government. For example, you can find here the reading skill requirements for an entry-level welder.

Elements of Job Literacy **(The Norback Job Literacy Structure), by Judith Shaul Norback, Center for Skills Enhancement, 1996.**

Norback has identified 26 categories of skills that constitute job literacy, of which 18 are within the areas of quantitative, document, and prose literacy. Others include such skills as following directions, computer use, and basic communication. For each of these 26 categories, she specifies the elements that constitute the category. This can serve as a checklist for looking at the requirements of any job or occupation.

***Different Approaches to Establishing Levels, Scales, and Equivalencies*, by Judith Shaul Norback, Center for Skills Enhancement (prepared for the Center for Workforce Development and the National Skill Standards Board).**

A first step in developing skill standards is to identify essential skills and knowledge for specific occupations. To communicate this to others, to determine the *extent* of skills and knowledge required, and to determine the degree to which individuals possess them, it is necessary to define levels and/or create scales. In this paper, Norback gives examples of how this is done in the U.S. and in two other countries.

***Workplace Competencies: The Need to Improve Literacy and Employment Readiness*, by Paul E. Barton and Irwin S. Kirsch, 1990.**

This is a general discussion of literacy, the labor market, and occupations, with recommendations for public policy. It was published by the U.S. Department of Education, with a Foreword by Christopher Cross.

Setting Performance Standards: Content, Goals, and Individual Differences, by **Bert F. Green, John Hopkins University.**

After setting "content standards," describing what people in various occupations must know and be able to do, and after expressing these in scales or levels, it is necessary to set "performance standards." Performance standards tell us *how much* you need to know or be able to do. In this paper published by the ETS Policy Information Center, Bert Green describes the approaches that are available for doing this.

Literacy: Economic Key for the New Millennium, **by Richard J. Coley, ETS Policy Notes, 1996.**

This publication is drawn from *Economy and Society: Results of the First International Adult Literacy Study*, published by the Organization for Economic Cooperation and Development, 1996. A key section is an international comparison of prose, document, and quantitative literacy by major occupational categories.

POLICY INFORMATION REPORT

BECOMING LITERATE ABOUT LITERACY

li·ter (lē′tər), *n.* a unit of capacity redefined in 1964 by a reduction of 28 parts in a million to be exactly equal to one cubic decimeter. It is equivalent to 1.0567 U.S. liquid quarts and is equal to the volume of one kilogram of distilled water at 4° C. *Abbr.:* l Also, *esp. Brit.*, **litre.** [1800–10; < F *litre*, back formation from *litron* an old measure of capacity, deriv. (with *-on* n. suffix) of ML *litra* < Gk *litra* pound]

lit·er·a·cy (lit′ər ə sē), *n.* **1.** the quality or state of being literate, esp. the ability to read and write. **2.** possession of education: *to question someone's literacy.* **3.** a person's knowledge of a particular subject or field: *to acquire computer literacy.* [1880–85; LITER(ATE) + -ACY] —**Syn. 2.** learning, culture.

lit′eracy test′, an examination to determine whether a person meets the literacy requirements for voting, serving in the armed forces, etc.; a test of one's ability to read and write. [1913–70]

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This report was written by Paul E. Barton of the ETS Policy Information Center.

Based on *Adult Literacy in America*, by Irwin S. Kirsch, Ann Jungeblut, Lynn Jenkins, and Andrew Kolstad.

Additional copies of this report can be ordered for $7.50 (prepaid) from:

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Preface

This brief volume is possible because of the recent National Adult Literacy Survey completed by Educational Testing Service, under contract with the National Center for Education Statistics. The initial results were reported in *Adult Literacy in America*, by Irwin S. Kirsch, Ann Jungeblut, Lynn Jenkins, and Andrew Kolstad. Subsequent volumes will provide even greater detail. This very brief summary of the findings is for the busy educator, policymaker, or interested citizen.

While this is a cursory review of the survey results, the subject still requires some effort on the part of the reader to comprehend the state of literacy in America. In producing so condensed a report, I have both shortened and sometimes paraphrased the descriptions of the five literacy levels provided in the original report.

We hope this summary will encourage many readers to seek more information from the comprehensive reports issued by the National Center for Education Statistics.

Paul E. Barton
Director
Policy Information Center

Acknowledgments

Richard J. Coley created the charts and graphs. The report was reviewed by Irwin Kirsch, Lynn Jenkins, and Howard Wainer at Educational Testing Service, and by Andrew Kolstad at the National Center for Education Statistics. Nivedita S. Niyogi provided the editing, Carla Cooper the desktop publishing services, and Ric Bruce was the designer.

Summary and Highlights

In 1992, under contract to the National Center for Education Statistics, Educational Testing Service assessed the literacy proficiencies of a nationally representative sample of all adults, age 16 and over. That assessment, the National Adult Literacy Survey, produced a profile of the entire adult population's English literacy skills along three proficiency scales, each ranging from 0 to 500: prose, document, and quantitative. The survey employed the following definition of literacy:

> *Using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential.*

Under this definition, literacy skills are on a continuum, and there is no single point that separates "illiterates" from those who are literate. Accordingly, each of the three scales (corresponding to the three types of literacy: prose, document, and quantitative) were divided into five progressive levels that are characterized by tasks of increasing complexity. For example, on the prose scale, tasks in Level 1 (0 to 225) include locating or identifying information in a brief text, whereas tasks in Level 4 (326-375) include making inferences and synthesizing information from complex and lengthy texts.

This volume draws on the results from the first official report of the National Adult Literacy Survey, issued in September 1993. The report, titled *Adult Literacy in America*, was written by Irwin Kirsch, Ann Jungeblut, Lynn Jenkins, and Andrew Kolstad.

Prose Literacy

- One in five adults performed at the lowest Prose level (Level 1). They can locate a single piece of information in a text, when there is little distracting information to deal with (page 6).*
- About one in four adults are at Prose Level 2. They can locate a single piece of information, when there is distracting information, and they can integrate, compare, and contrast information (page 7).
- Three in 10 adults are at Level 3. They can match information in a text to that in the directive given to them, when some inference is required (page 8).
- One in six adults are at Level 4. They can integrate and synthesize information from complex or lengthy passages and make more complex inferences (page 9).
- Just one in 33 adults — at Level 5 — can make high-level inferences based on text and can find information in dense text with considerable distracting information that might seem plausible but is incorrect (page 10).

Document Literacy

- Almost one in four adults are at Level 1 in Document Literacy. They can match information and fill in personal information on forms (page 11).*
- Almost three in 10 are at Level 2. They can match information in documents that contain distractors, and they can integrate information from several places in a document (page 12).
- Three in 10 adults are at Level 3. They can integrate several pieces of information and deal with rather complex tables and graphs that contain information not pertaining to the task (page 13).
- Almost one in seven adults are at Level 4. They can do tasks requiring greater inferences and involving more detailed information (page 14).
- One in 33 adults are at Level 5. They can use complex documents that contain distracting information and make high-level inferences (page 15).

Quantitative Literacy

- Over one in five adults are at Level 1. They can perform single, relatively simple operations (page 16).*
- One in four adults are at Level 2. They can perform an arithmetic operation using numbers given to them or easily located in the material (page 17).
- Three in 10 of all adults are at Level 3. They can solve problems with two or more numbers that must be found in printed material (page 18).
- One in six adults are at Level 4 and can handle two or more arithmetic operations in sequence (page 19).
- One in 25 adults perform at Level 5. They can perform multiple arithmetic operations sequentially (page 20).

* Level 1 is from 0 to 225; some adults are at the lower end of this level where they cannot perform even these routine tasks.

■ Among 40 million adults in the lowest level of Prose Literacy (Level 1), one in four have some kind of limiting physical or mental condition that may impair their literacy skills, or make improvement more difficult (page 21).

■ Literacy and the exercise of citizenship in a democracy are related. Higher levels of literacy go hand-in-hand with voting or obtaining information from newspapers and magazines (page 22).

■ The prison population is considerably less literate than the general population. Almost seven in 10 prisoners are at Levels 1 and 2 of Prose Literacy, compared with less than half of the general population (page 23).

■ Prose proficiency rises with education level. Three-fourths of adults with between zero and eight years of school are in Level 1, as are four in 10 high school dropouts. Over 75 percent of two-year college graduates, and 85 percent of four-year college graduates, reach at least Level 3. However, just 4 and 10 percent, respectively, reach Level 5 (page 24).

■ While fewer middle-age adults are at lower literacy levels than young adults, older adults are considerably less literate. However, older adults also have less education than middle-age or young adults (page 27).

■ Parents' education greatly influences the literacy proficiency levels reached by their children. Even among respondents with similar levels of education, those with better educated parents have higher prose literacy proficiencies (page 28).

■ Poverty and literacy are closely related; 43 percent of adults in Level 1 are poor or near poor, compared with just 4 percent in Level 5 (page 25).

■ Weekly wages and weeks worked per year rise with literacy level: Adults at Level 5 earn 2 1/2 times as much as adults at Level 1, and work more than twice as many weeks (page 26).

■ The average prose proficiencies of Black, Asian, Hispanic/Puerto Rican, Hispanic/Cuban, Hispanic/Central and South American, and Hispanic/Mexican adults are lower than the average proficiency of all laborers (page 29).

Our nation's growing concern about its state of literacy has been evident in local and state legislation, programs at all levels of government, and in a multitude of campaigns urging action. We are fortunate that the concern and the efforts to increase literacy exist, but unfortunately, these campaigns have had very little to go on in terms of hard information. There has been a lack of reliable information about the state of literacy in the population at large.

True, numbers have been used in abundance — most of us have seen at least one of the advertisements stating something to the effect of "x number of Americans can't read this ad" or "x number of high school graduates cannot read their high school diplomas." While the advertisements may serve as a wake-up call to the public, they are, nonetheless, misrepresentations of a complex problem. These numbers are based on distorted information and, by oversimplification, can hinder efforts to improve literacy.

One consequence of presenting the literacy problem in simple terms of how many people can't read or write is that it fosters a widespread belief that assessing literacy is a simple process — it can all be boiled down to a single number. As we proceed to examine the results of the first, large-scale national literacy assessment of all adults (age 16 and over), the first step we must take is to dispel that myth and become literate about literacy. We owe it to ourselves and to the thousands of people who are dedicated to improving literacy in this nation.

This summary report draws upon the results of the National Adult Literacy Survey, mandated by Congress and carried out by the National Center for Education Statistics through a contract with Educational Testing Service. *Adult Literacy in America* is the first report from the survey, written by Irwin S. Kirsch, Ann Jungeblut, Lynn Jenkins, and Andrew Kolstad.

The term literacy is often used as just the opposite of illiteracy, and that term has come to be used as meaning that a person cannot read at all, cannot decode the printed word, and does not comprehend what is written. But literacy has a much richer and deeper meaning than that. Its dictionary definitions range from being able to read and write to being a well informed, educated person and to being familiar with literature. In the young adult literacy assessment of 1985, in an assessment of populations served by the U.S. Department of

Labor in 1990, and in this new assessment of all adults, the same definition was adopted by a broadly representative group of experts, as follows:

> *Using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential.*

This definition encompasses the multifaceted nature of literacy — it is not a single skill, i.e. reading, but rather literacy involves an ordered set of skills that are necessary to accomplish various tasks in various contexts. Balancing a checkbook, obtaining information from a train schedule, and understanding a passage from a novel — each of these tasks call for literacy skills but not the same skills. The National Adult Literacy Survey employed three proficiency scales to measure these distinct skills: prose, document, and quantitative. Their definitions are as follows:

Prose literacy — the knowledge and skills needed to understand and use information from texts that include editorials, news stories, poems, and fiction; for example, finding a piece of information in a newspaper article, interpreting instructions from a warranty, inferring a theme from a poem, or contrasting views expressed in an editorial.

Document literacy — the knowledge and skills required to locate and use information contained in materials that include job applications, payroll forms, transportation schedules, maps, tables, and graphs; for example, locating a particular intersection on a street map, using a schedule to choose the appropriate bus, or entering information on an application form.

Quantitative literacy — the knowledge and skills required to apply arithmetic operations, either alone or sequentially, using numbers embedded in printed materials; for example, balancing a checkbook, figuring out a tip, completing an order form, or determining the amount of interest from a loan advertisement.

More than 400 trained interviewers conducted the survey, administering the literacy assessment in nearly 27,000 homes during the first eight months of 1992. A separate assessment was carried out for the prison population. The assessment consisted of a set of tasks that simulated real life situations encountered at home, at work, and in the community. Almost all the tasks required participants to construct their responses, as opposed to choosing a response from multiple choices.

To ensure the broadest possible coverage of prose, document, and quantitative literacy, there were a total of 166 tasks requiring a variety of information-processing skills and strategies. For purposes of efficiency, each survey participant responded to a subset of these tasks, which were compiled in booklets that took about 45 minutes to complete. Additionally, participants spent about 20 minutes completing personal background questionnaires. The background data informs our understanding of the ways in which personal characteristics (race/ethnicity, age, educational attainment, labor market experiences, access to printed materials, etc.) are associated with demonstrated performance on each literacy scale.

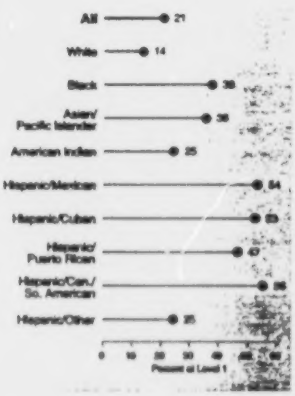
One way of presenting the results would be to describe how all adults did on all 166 tasks. To do so would place a very large burden on the reader, making it difficult to conclude what the state of literacy is for each population group. To help make such judgments, statistical methods were used to construct proficiency scales from the answers to the tasks, scales similiar to the ones used to report the results of the SAT. The National Adult Literacy Survey scales range from 0 to 500. Individual tasks are assigned scores along the scales, to give examples of what people with a particular score are likely to be able to do. The scales were then divided into five levels, each encompassing a defined score range, such as from 226 to 275. Individuals scoring within these scale levels would have a high probability of performing the tasks at that level successfully (a high probability is defined as at least 80 percent of the time).*

The sections that follow present highlights of the adult literacy survey. The first parts include data on each of the five levels of prose, document, and quantitative literacy. For each level, we describe what a typical adult at that literacy level can do, and also show an example of an item or exercise actually used in the assessment. We also show the percentage of respondents that reach that particular level for each racial/ethnic group. The following sections show the relationship of literacy to respondents' social and economic characteristics. The final section offers some concluding thoughts.

* And they would have a small chance of performing tasks at a higher level.

PROSE LITERACY, LEVEL 1 (0 TO 225)

One in five adults performed at the lowest Prose level (Level 1). They can locate a single piece of information in a text, when there is little distracting information to deal with.



They can:

read relatively short text to locate a single piece of information that is identical to, or synonymous with, the information given in the question or directive. Distracting information is minimal.*

They are likely to succeed at tasks such as:

- Identify the country in a short article *(149)*
- Locate one piece of information in a sports article *(210)* (See below)
- Underline a sentence explaining the action stated in a short article *(225)*

* However, some were at the lower end of this level where they could not perform even these routine tasks.

EXAMPLE TASK

Underline the sentence that tells what Ms. Chanin ate during the swim

Swimmer completes Manhattan marathon

The Associated Press

NEW YORK—University of Maryland senior Stacy Chanin on Wednesday became the first person to swim three 28-mile laps around Manhattan.

Chanin, 23, of Virginia, climbed out of the East River at 96th Street at 9:30 p.m. She began the swim at noon on Tuesday.

A spokesman for the swimmer, Roy Brunett, said Chanin had kept up her strength with "banana and honey" sandwiches, hot chocolate, lots of water and granola bars."

Chanin has twice circled Manhattan before and trained for the new feat by swimming about 28.4 miles a week. The Yonkers native has competed as a swimmer since she was 15 and hoped to persuade Olympic authorities to add a long-distance swimming event.

The Leukemia Society of America solicited pledges for each mile she swam.

In July 1983, Julie Ridge became the first person to swim around Manhattan twice. With her three laps, Chanin came up just short of Diana Nyad's distance record, set on a Florida-to-Cuba swim.

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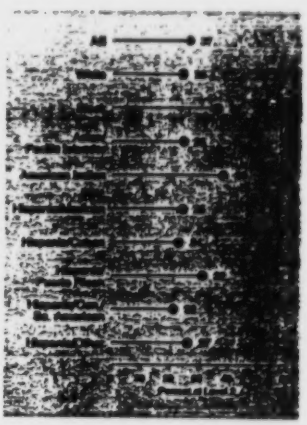
PROSE LITERACY, LEVEL 2 (226 TO 275)

About one in four adults are at Prose Level 2. They can locate a single piece of information when there is distracting information, and they can integrate, compare, and contrast information.



They can:
locate a single piece of information when there is distracting information or other information that seems plausible as the answer but is incorrect. They can also integrate, compare, or contrast two or more pieces of information.

They are likely to succeed at tasks such as:

- Underline meaning of a term given in government brochure on supplemental security income *(226)*
- Locate two features of information in a sports article *(250)*
- Interpret instructions from an appliance warranty *(275)* (See below)

EXAMPLE TASK

A manufacturing company provides its customers with the following instructions for returning appliances for service:

> When returning appliance for servicing, include a note telling as clearly and as specifically as possible what is wrong with the appliance.

A repair person for the company receives four appliances with the following notes attached. Circle the letter next to the note which best follows the instructions supplied by the company.

A. The clock does not run correctly on this clock radio. I tried fixing it, but I couldn't.

B. My clock radio is not working. It stopped working right after I used it for five days.

C. The alarm on my clock radio doesn't go off at the time I set. It rings 15-30 minutes later.

D. This radio is broken. Please repair and return by United Parcel Service to the address on my slip.

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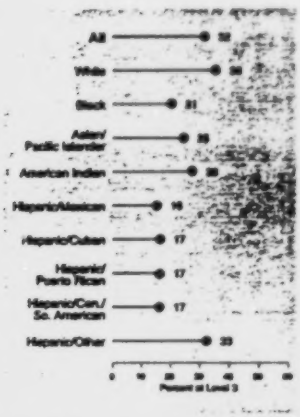
Three in 10 adults can match information in a text to that in the directive given to them, when some inference is required.



They can:

match information in the text and in the task when low level inferences are required, integrate information from dense or lengthy text, and generate a response based on information easily identified in the text.

They are likely to succeed at tasks such as:

- Write a brief letter explaining error made on a credit card bill *(288)*
- Read a news article and identify a sentence that provides interpretation of a situation *(304)*
- Read a lengthy article to identify behaviors that meet a stated condition *(316)*

EXAMPLE TASK

List two things that Chen became involved in or has done to help resolve conflicts due to discrimination.

IDA CHEN is the first Asian-American woman to become a judge of the Commonwealth of Pennsylvania.

She understands discrimination because she has experienced it herself.

Soft-spoken and eminently dignified, Judge Ida Chen prefers hearing about a new acquaintance rather than talking about herself. She wants to know about career plans, hopes, dreams, fears. She gives unsolicited advice as well as encouragement. She instills confidence.

Her father once hoped that she would become a professor. And she would have also made an outstanding social worker or guidance counselor. The truth is that Chen wears the caps of all these professions as a Family Court judge of the Court of Common Pleas of Philadelphia County, as a participant in public advocacy for minorities, and as a particularly sensitive, caring person.

She understands discrimination because she has experienced it herself. As an elementary school student, Chen tried to join the local Brownie troop. "You can't be a member," she was told. "Only American girls are in the Brownies."

Originally intent upon a career as a journalist, she selected Temple University because of its outstanding journalism department and affordable tuition. Independence being a personal need, she paid for her tuition by working for Temple's Department of Criminal Justice. There she had her first encounter with the legal world and it turned her career plans in a new direction — law school.

Through meticulous planning, Chen was able to earn her undergraduate degree in two and a half years and she continued to work three jobs. But when she began her first semester as a Temple law student in the fall of 1973, she was barely able to stay awake. Her teacher Lynne Abraham, now a Common Pleas Court judge herself, couldn't help but notice Chen yawning in the back of the class, and when she determined that this student was not a party animal but a workhorse, she arranged a teaching assistant's job for Chen on campus.

After graduating from Temple Law School in 1976, Chen worked for the U.S. Equal Employment Opportunity Commission where she was a litigator on behalf of plaintiffs who experienced discrimination in the workplace, and then moved on to become the first Asian-American to serve on the Philadelphia Commission on Human Relations.

Appointed by Mayor Wilson Goode, Chen worked with community leaders to resolve racial and ethnic tensions and also made time to contribute free legal counsel to a variety of activist groups.

The "Help Wanted" section of the newspaper contained an entry that aroused Chen's curiosity — an ad for a judge's position. Her application resulted in her selection by a state judicial committee to fill a seat in the state court. And in July of 1988, she officially became a judge of the Court of Common Pleas. Running as both a Republican and Democratic candidate, her position was secured when she won her seat on the bench at last November's election.

At Family Court, Chen presides over criminal and civil cases which include adult sex crimes, domestic violence, juvenile delinquency, custody, divorce and support. Not a pretty picture.

Chen recalls her first day as judge, hearing a juvenile dependency case — "It was a horrifying experience. I broke down because the cases were so depressing," she remembers.

Outside of the courtroom, Chen has made a name for herself in resolving interracial conflicts, while glorying in her Chinese-American identity. In a 1986 incident involving the desecration of Korean street signs in a Philadelphia neighborhood, Chen called for a meeting with the leaders of that community to help resolve the conflict.

Chen's interest in community advocacy is not limited to Asian communities. She has been involved in Hispanic, Jewish and Black issues, and because of her participation in the Ethnic Affairs Committee of the Anti-Defamation League of B'nai B'rith, Chen was one of 10 women nationwide selected to take part in a mission to Israel.

With her recently won mandate to judicate in the affairs of Pennsylvania's citizens, Chen has pledged to work tirelessly to defend the rights of its people and contribute to the improvement of human welfare. She would have made a fabulous Brownie.

— Jessica Schultz

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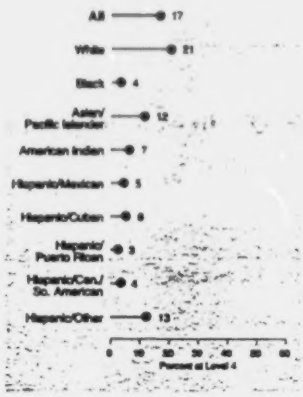
PROSE LITERACY, LEVEL 4 (326 TO 375)

One in six adults can integrate and synthesize information from complex or lengthy passages and make more complex inferences.



They can:
match text with multiple features, integrate or synthesize information from complex or lengthy passages, and make more complex inferences.

They are likely to succeed at tasks such as:

- State in writing an argument made in a lengthy newspaper article *(328)*
- Contrast views expressed in two editorials on technologies available to make fuel-efficient cars *(359)* (See below)
- Compare two metaphors used in a poem *(374)*

EXAMPLE TASK

Contrast Dewey's and Hanna's views about the existence of technologies that can be used to produce more fuel-efficient cars while maintaining the size of the cars.

Face-Off: Getting More Miles Per Gallon

Demand cars with better gas mileage

By Robert Dewey
Guest columnist

WASHINGTON — Warning: Automakers are resurrecting their heavy-metal dinosaurs, aka gas guzzlers.

Government reports show that average new-car mileage has declined to 28.2 miles per gallon — the 1986 level. To reverse this trend, Congress must significantly increase existing gas-mileage standards.

More than half our Nobel laureates and 700 members of the National Academy of Sciences recently called global warming "the most serious environmental threat of the 21st century." In 1989, oil imports climbed to a near-record 46% of U.S. consumption. Increasing gas mileage is the single biggest step we can take to reduce oil imports and curb global warming. Greater efficiency also lowers our trade deficit (oil imports represent 40% of it) and decreases the need to drill in pristine areas.

Bigger engines and bigger cars mean bigger profits for automakers, who offer us the products they want us to buy. More than ever, Americans want products that have less of an environmental impact. But with only a few fuel-efficient cars to choose from, how do we find ones that meet all our needs?

Government studies show automakers have the technology to dramatically improve gas mileage — while maintaining the 1987 levels of comfort, performance and size mix of vehicles. Automakers also have the ability to make their products safer. The cost of these improvements will be offset by savings at the gas pump!

Cars can average 45 mpg and light trucks 35 mpg primarily by utilizing engine and transmission technologies already on a few cars today. Further improvements are possible by using technologies like the two-stroke engine and better aerodynamics that have been developed but not used.

When the current vehicle efficiency standards were proposed in 1974, Ford wrongly predicted that they "would require either all sub-Pinto-sized vehicles or some mix of vehicles ranging from a sub-subcompact to perhaps a Maverick." At that time, Congress required a 100% efficiency increase; raising gas mileage to 45 mpg requires only a 60% increase.

Americans want comfortable, safe and efficient cars. If automakers won't provide them, Congress must mandate them when it considers the issue this summer.

Let's hope lawmakers put the best interest of the environment and the nation ahead of the automakers' lobbyists and political action committees.

Robert Dewey is a conservation analyst for the Environmental Action Foundation.

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Don't demand end to cars people want

By Thomas H. Hanna
Guest columnist

DETROIT — Do Americans look forward to the day when they'll have to haul groceries, shuttle the kids to and from school or take family vacations in compact and subcompact cars?

I doubt it — which is why U.S. and import carmakers oppose the 40-miles-per-gallon to 45 mpg corporate average fuel economy mandates that some are pushing in Congress, either to curb tailpipe carbon dioxide emissions because of alleged global warming or for energy conservation.

Since the mid-1970s, automakers have doubled the fleet average fuel economy of new cars to 28 mpg — and further progress will be made.

Compact and subcompact cars with mileage of 40 mpg or better are now available, yet they appeal to only 8% of U.S. car buyers.

But to achieve a U.S. fleet average of 40 mpg to 45 mpg, carmakers would have to sharply limit the availability of family-size models and dramatically trim the size and weight of most cars.

There simply are not magic technologies to meet such a standard.

Almost every car now sold in the USA would have to be drastically downsized, and many would be obsolete.

As a result, Americans each year would be unable to buy the vehicles most suited for their needs: mid- and family-size models, luxury automobiles, mini-vans, small trucks and utility vehicles.

The fleet shift to compacts and subcompacts could also force the closing of assembly plants, supplier firms and dealerships, at a cost of thousands of U.S. jobs.

Although a growing number of scientists are skeptical of global warming, the issue deserves thorough international scientific evaluation, not premature unilateral U.S. action.

Carbon dioxide emissions from U.S. vehicles total less than 2.6% of worldwide "greenhouse" gases. Even doubling today's corporate average fuel economy for U.S. cars — if technically possible — would cut those gases about 5%

Whatever the motivation — alleged global warming or energy conservation — the stakes are high for millions of Americans and thousands of U.S. jobs in unrealistic corporate average fuel economy mandates.

Thomas H. Hanna is president and chief executive officer of the Motor Vehicle Manufacturers Association of the United States.

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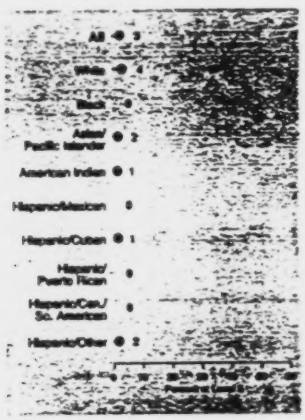
Just one in 33 adults can make high level inferences based on text and can find information in dense text with considerable distracting information that might seem plausible but is incorrect.



They can:
find information in a dense text that contains considerable information that is distracting — information that may seem plausible as an answer but is incorrect. Also, they can make high-level inferences or use specialized background knowledge.

They are likely to succeed at tasks such as:

- Compare the approaches stated in a narrative on growing up *(382)*
- Summarize two ways lawyers may challenge prospective jurors *(410)* (See below)
- Interpret a brief phrase from a lengthy news article *(423)*

EXAMPLE TASK

Identify and summarize the two kinds of challenges that attorneys use while selecting members of a jury.

DO YOU HAVE A QUESTION?

QUESTION: What is the new program for scheduling jurors?

ANSWER: This is a new way of organizing and scheduling jurors that is being introduced all over the country. The goals of this program are to save money, increase the number of citizens who are summoned to serve and decrease the inconvenience of serving.

The program means that instead of calling jurors for two weeks, jurors now serve only one day, or for the length of one trial if they are selected to hear a case. Jurors who are not selected to hear a case are excused at the end of the day, and their obligations to serve as jurors are fulfilled for three years. The average trial lasts two days once testimony begins.

An important part of what is called the One Day – One Trial program is the "standby" juror. This is a person called to the Courthouse if the number of cases to be tried requires more jurors than originally estimated. Once called to the Courthouse, the standby becomes a "regular" juror, and his or her service is complete at the end of one day or one trial, the same as everyone else.

Q. How was I summoned?

A. The basic source for names of eligible jurors is the Driver's License list which is supplemented by the voter registration list. Names are chosen from these combined lists by a computer in a completely random manner.

Once in the Courthouse, jurors are selected for a trial by this same computer and random selection process.

Q. How is the Jury for a particular trial selected?

A. When a group of prospective jurors is selected, more than the number needed for a trial are called. Once this group has been seated in the courtroom, either the Judge or the attorneys ask questions. This is called *voir dire*. The purpose of questions asked during *voir dire* is to ensure that all of the jurors who are selected to hear the case will be unbiased, objective and attentive.

In most cases, prospective jurors will be asked to raise their hands when a particular question applies to them. Examples of questions often asked are: Do you know the Plaintiff, Defendant or the attorneys in this case? Have you been involved in a case similar to this one yourself? Where the answer is yes, the jurors raising hands may be asked additional questions, as the purpose is to guarantee a fair trial for all parties. When an attorney believes that there is a legal reason to excuse a juror, he or she will challenge the juror for cause. Unless both attorneys agree that the juror should be excused, the Judge must either sustain or override the challenge.

After all challenges for cause have been ruled upon, the attorneys will select the trial jury from those who remain by exercising peremptory challenges. Unlike challenges for cause, no reason need be given for excusing a juror by peremptory challenge. Attorneys usually exercise these challenges by taking turns striking names from a list until both are satisfied with the jurors at the top of the list or until they use up the number of challenges allowed. Challenged jurors and any extra jurors will then be excused and asked to return to the jury selection room.

Jurors should not feel rejected or insulted if they are excused for cause by the Court or peremptorily challenged by one of the attorneys. The *voir dire* process and challenging of jurors is simply our judicial system's way of guaranteeing both parties to a lawsuit a fair trial.

Q. Am I guaranteed to serve on a jury?

A. Not all jurors who are summoned actually hear a case. Sometimes all the Judges are still working on trials from the previous day, and no new jurors are chosen. Normally, however, some new cases begin every day. Sometimes jurors are challenged and not selected.

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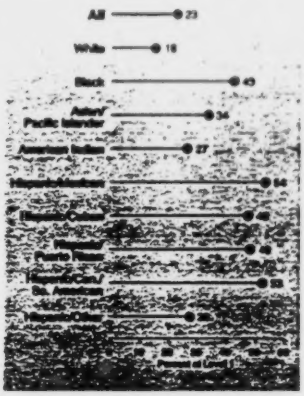
DOCUMENT LITERACY, LEVEL 1 (0 TO 225)

Almost one in four adults are at Level 1 in Document Literacy. They can match information and fill in personal information on forms.



They can:
locate a piece of information based on a literal match between the task and the document or enter information from personal knowledge onto a document. Little, if any, distracting information is present.*

They are likely to succeed at tasks such as:
- Sign their names *(69)*
- Locate time of meeting on a form *(180)*
- Use a pie graph to locate type of vehicle having specific sales *(214)*

* However, some were at the lower end of this level where they could not perform even these routine tasks.

EXAMPLE TASK

You have gone to an employment center for help in finding a job. You know that this center handles many different kinds of jobs. Also, several of your friends who have applied here have found jobs that appeal to you.

The agent has taken your name and address and given you the rest of the form to fill out. Complete the form so the employment center can help you get a job.

Birth date_____ Age____ Sex: Male____ Female____

Height_____ Weight_____ Health_____

Last grade completed in school_____

Kind of work wanted:

Part-time_____ Summer_____

Full-time_____ Year-round_____

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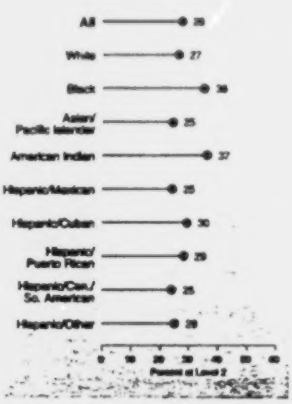
DOCUMENT LITERACY, LEVEL 2 (226 TO 275)

Almost three in 10 adults can match information in documents that contain distractors, and they can integrate information from several places in a document.



They can:
match a single piece of information, with distracting information present, or requiring a low level of inference. They may also integrate information from various parts of the document.

They are likely to succeed at tasks such as:
- Locate an intersection on a street map *(230)*
- Locate eligibility from table of employee benefits *(246)*
- Identify and enter background information on application for social security card *(259)*

EXAMPLE TASK

What is the gross pay for this year to date?

HOURS				PERIOD ENDING	REGULAR	OVERTIME	GROSS	DEF AMN	NET PAY
REGULAR	SICK DAILY	OVERTIME	TOTAL						
500			500	03/15/85					
				CURRENT	62500		62500		45988
				YEAR TO DATE			426885		

TAX DEDUCTIONS

	FED W/H	STATE W/H	CITY W/H	FICA
CURRENT	10894	1375		3831
YEAR TO DATE	73498	8250		26167

OTHER DEDUCTIONS

CR UNION		UNITED FD	PERS INS	MISC	MISC CODE

OTHER DEDUCTIONS

CODE	TYPE	AMOUNT	CODE	TYPE	AMOUNT
07	DEN	412			

NON-NEGOTIABLE

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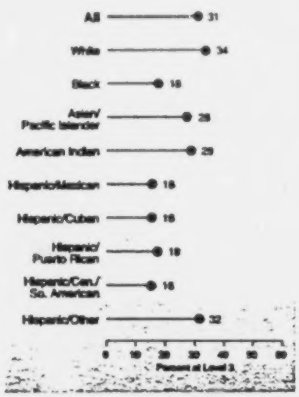
DOCUMENT LITERACY, LEVEL 3 (276 TO 325)

Three in 10 adults are at Level 3 in Document Literacy. They can integrate several pieces of information and deal with rather complex tables and graphs that contain information not pertaining to the task.



They can:
integrate several pieces of information from one or several documents and deal with rather complex tables or graphs which contain information that is irrelevant or inappropriate to the task.

They are likely to succeed at tasks such as:

- Identify information from bar graph depicting source of energy and year *(277)*
- Use sign out sheet to respond to call about resident *(298)*
- Enter information given into an automobile maintenance record form *(323)*

EXAMPLE TASK

You need to smooth wood in preparation for sealing and plan to buy garnet sandpaper. What type of sandpaper should you buy?

ABRASIVE SELECTION GUIDE

MATERIAL & OPERATION	PRODUCTION					GARNET				WETORDRY				FRE-CUT		EMERY		
	EC	C	M	F	EF	C	M	F	EF	VF	EF	SF	UF	VF	EF	C	M	F
WOOD																		
Paint Removal	■	■																
Heavy Stock Removal	■	■				■												
Moderate Stock Removal			■				■											
Preparation for Sealing				■				■										
After Sealer					■				■		■							
Between Coats											■	■			■			
After Final Coat												■	■					
METAL																		
Rust and Paint Removal	■	■														■		
Light Stock Removal	■	■																
Preparation for Priming			■	■										■			■	
Finishing and Polishing					■					■	■	■	■					■
After Primer												■			■			
Between Coats											■	■						
After Final Coat													■					
PLASTIC & FIBERGLASS																		
Shaping	■	■																
Light Stock Removal			■	■	■					■				■				
Finishing & Scuffing																		

EC = Extra Coarse C = Coarse M = Medium F = Fine VF = Very Fine EF = Extra Fine SF = Super Fine UF = Ultra Fine

SAFETY INFORMATION:

■ Wear approved safety goggles when sanding.

■ Use particle/dust mask or other means to prevent inhalation of sanding dust.

■ When using power tools, follow manufacturer's recommended procedures and safety instructions.

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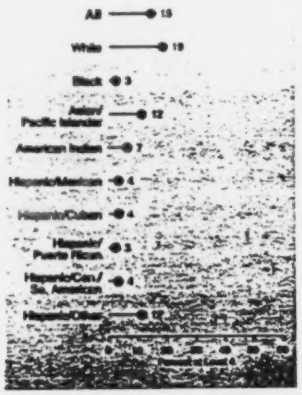
DOCUMENT LITERACY, LEVEL 4 (326 TO 375)

Almost one in seven adults are at Level 4. They can do tasks requiring greater inferences and involving more detailed information.



They can:
perform tasks that require them to draw higher level inferences and numerous responses without being told how many are needed. They can also perform tasks that contain conditional information.

They are likely to succeed at tasks such as:

- Identify the correct percentage meeting specified conditions from a table of such information *(342)*
- Use a bus schedule to determine appropriate bus for given set of conditions *(352)* (See below)
- Use a table of information to determine pattern in oil exports across years *(352)*

EXAMPLE TASK

On Saturday afternoon, if you miss the 2:35 bus leaving Hancock and Buena Ventura going to Flintridge and Academy, how long will you have to wait for the next bus?

A Until 2:57 p.m. **B** Until 3:05 p.m. **C** Until 3:35 p.m. **D** Until 3:57 p.m. **E** I don't know

ROUTE **5**

VISTA GRANDE

This bus line operates Monday through Saturday providing "local service" to most neighborhoods in the northeast section.
Buses run thirty minutes apart during the morning and afternoon rush hours Monday through Friday.
Buses run one hour apart at all other times of day and Saturday.
No Sunday, holiday or night service.

OUTBOUND
from Terminal

INBOUND
toward Terminal

You can transfer from this bus to another headed anywhere else in the city bus system

	Leave Downtown Terminal	Leave Hancock and Buena Ventura	Leave Citadel	Leave Rustic Hills	Leave North Crestline and Oro Blanco	Arrive Flintridge and Academy	Leave Flintridge and Academy	Leave North Crestline and Oro Blanco	Leave Rustic Hills	Leave Citadel	Leave Hancock and Buena Ventura	Arrive Downtown Terminal	
AM							6:15	6:27	6:42	6:47	6:57	7:15	
							6:45	6:57	7:12	7:17	7:27	7:45	Monday through Friday only
	6:20	6:35	6:45	6:50	7:03	7:15	7:15	7:27	7:42	7:47	7:57	8:15	
	6:50	7:05	7:15	7:20	7:33	7:45	7:45	7:57	8:12	8:17	8:27	8:45	Monday through Friday only
	7:20	7:35	7:45	7:50	8:03	8:15	8:15	8:27	8:42	8:47	8:57	9:15	
	7:50	8:05	8:15	8:20	8:33	8:45	8:45	8:57	9:12	9:17	9:27	9:45	Monday through Friday only
	8:20	8:35	8:45	8:50	9:03	9:15	9:15	9:27	9:42	9:47	9:57	10:15	
	8:50	9:05	9:15	9:20	9:33	9:45	9:45	9:57	10:12	10:17	10:27	10:45	Monday through Friday only
	9:20	9:35	9:45	9:50	10:03	10:15	10:15	10:27	10:42	10:47	10:57	11:15	
	10:20	10:35	10:45	10:50	11:03	11:15	11:15	11:27	11:42	11:47	11:57	12:15	
	11:20	11:35	11:45	11:50	12:03	12:15	12:15	12:27	12:42 p.m.	12:47 p.m.	12:57 p.m.	1:15 p.m.	
PM	12:20	12:35	12:45	12:50	1:03	1:15	1:15	1:27	1:42	1:47	1:57	2:15	
	1:20	1:35	1:45	1:50	2:03	2:15	2:15	2:27	2:42	2:47	2:57	3:15	
	2:20	2:35	2:45	2:50	3:03	3:15	3:15	3:27	3:42	3:47	3:57	4:15	
	2:50	3:05	3:15	3:20	3:33	3:45	3:45	3:57	4:12	4:17	4:27	4:45	Monday through Friday only
	3:20	3:35	3:45	3:50	4:03	4:15	4:15	4:27	4:42	4:47	4:57	5:15	
	3:50	4:05	4:15	4:20	4:33	4:45	4:45	4:57	5:12	4:17	5:27	5:45	Monday through Friday only
	4:20	4:35	4:45	4:50	5:03	5:15	5:15	5:27	5:42	5:47	5:57	6:15	
	4:50	5:05	5:15	5:20	5:33	5:45	5:45	5:57	6:12	6:17	6:27	6:45	Monday through Friday only
	5:20	5:35	5:45	5:50	6:03	6:15							
	5:50	6:05	6:15	6:20	6:33	6:45							Monday through Friday only
	6:20	6:35	6:45	6:50	7:03	7:15							

To be sure of a smooth transfer tell the driver of this bus the name of the second bus you need.

21

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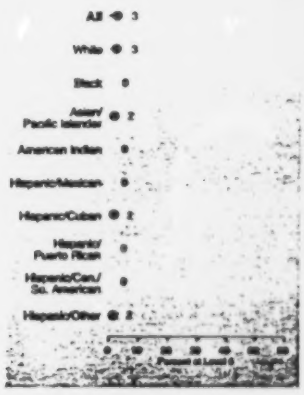
DOCUMENT LITERACY, LEVEL 5 (376 TO 500)

One in 33 adults are at Document Level 5. They can use complex documents that contain distracting information and make high level inferences.



They can:
search through complex displays that contain several pieces of distracting information, make high level inferences from the text, and make use of specialized knowledge.

They are likely to succeed at tasks such as:

- Use information in a table to complete a graph including labeling axes *(378)*
- Use a table to compare credit cards; Identify the two categories used and write two differences between them *(387)*
- Use a table depicting information about parental involvement in a school survey to write a paragraph summarizing the extent to which parents and teachers agree *(395)* (See below)

EXAMPLE TASK

Using the information in the table, write a brief paragraph summarizing the extent to which parents and teachers agreed or disagreed on the statements about issues pertaining to parental involvement at their school.

Parents and Teachers Evaluate Parental Involvement at Their School

Do you agree or disagree that . . . ?

	Total	Level of School		
		Elementary	Junior High	High School
		percent agreeing		
Our school does a good job of encouraging parental involvement in sports, arts, and other nonsubject areas				
Parents	77	76	74	79
Teachers	77	73	77	83
Our school does a good job of encouraging parental involvement in educational areas				
Parents	73	82	71	64
Teachers	80	84	78	70
Our school only contacts parents when there is a problem with their child				
Parents	40	40	42	37
Teachers	10	10	22	24
Our school does not give parents the opportunity for any meaningful roles				
Parents	22	18	22	27
Teachers	8	8	12	5

Source: The Metropolitan Life Survey of the American Teacher, 1987

22

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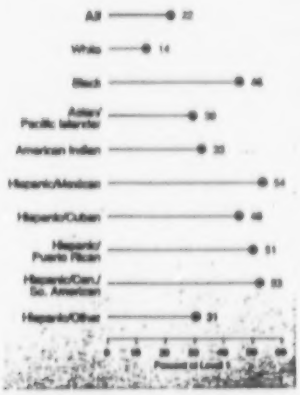
QUANTITATIVE LITERACY, LEVEL 1 (0 TO 225)

Over one in five adults are at Quantitative Literacy Level 1. They can perform single, relatively simple operations.



They can:
perform a single, relatively simple arithmetic operation, such as addition. The numbers to be used are provided, and the operation to be performed is specified.*

They are likely to succeed at tasks such as:
- Total a bank deposit entry *(191)* (See below)

* Level 1 is from 0 to 225; some are at the lower end of this level where they cannot perform even these routine tasks.

EXAMPLE TASK

You wish to use the automatic teller machine at your bank to make a deposit. Figure the total amount of the two checks being deposited. Enter the amount on the form in the space next to TOTAL.

Availability of Deposits

Funds from deposits may not be available for immediate withdrawal. Please refer to your institution's rules governing funds availability for details.

Crediting of deposits and payments is subject to verification and collection of actual amounts deposited or paid in accordance with the rules and regulations of your financial institution.

PLEASE PRINT

YOUR MAC CARD NUMBER (No PINs PLEASE)
111 222 3334

YOUR FINANCIAL INSTITUTION
Union Bank

YOUR ACCOUNT NUMBER
987 555 674

YOUR NAME
Chris Jones

CHECK ONE ☐ DEPOSIT or ☐ PAYMENT

CASH	$	00
LIST CHECKS BY BANK NO.	ENDORSE WITH NAME & ACCOUNT NUMBER	
	557	19
	75	00
TOTAL		

DO NOT DETACH TICKET

DO NOT FOLD NO COINS OR PAPER CLIPS PLEASE

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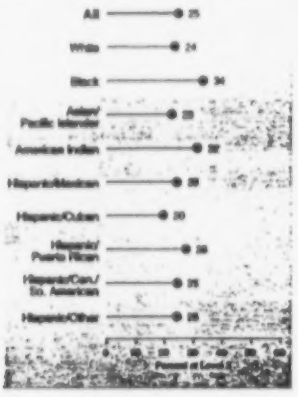
One in four adults are at Level 2. They can perform an arithmetic operation using numbers given to them or easily located in the material.



They can:
perform a single arithmetic operation using numbers that are given in the task or easily located in the material. The operation to be performed is either described in the task or easily determined from the format of the material (for example, an order form).

They are likely to succeed at tasks such as:
- Calculate postage and fees for certified mail *(238)*
- Determine the difference in price between tickets for two shows *(246)* (See below)
- Calculate the total costs of purchase from an order form *(270)*

EXAMPLE TASK

The price of one ticket and bus for "Sleuth" costs how much less than the price of one ticket and bus for "On the Town"?

THEATER TRIP

A charter bus will leave from the bus stop (near the Conference Center) at 4 p.m., giving you plenty of time for dinner in New York. Return trip will start from West 45th Street directly following the plays. Both theaters are on West 45th Street. Allow about 1½ hours for the return trip.

Time:	4 p.m., Saturday, November 20		
Price:	"On the Town"	Ticket and bus	$11.00
	"Sleuth"	Ticket and bus	$8.50
Limit:	Two tickets per person		

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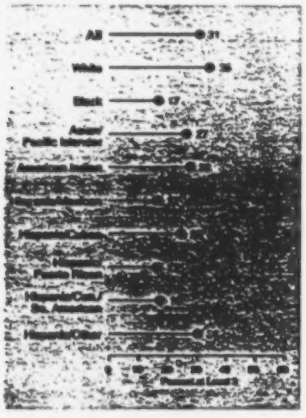
Three in 10 of all adults are at Level 3. They can solve problems with two or more numbers that must be found in printed material.



They can:
perform tasks where two or more numbers are typically needed to solve the problem, and these must be found in the material. The operation(s) needed can be determined from the arithmetic relation terms used in the question or directive.

They are likely to succeed at tasks such as:

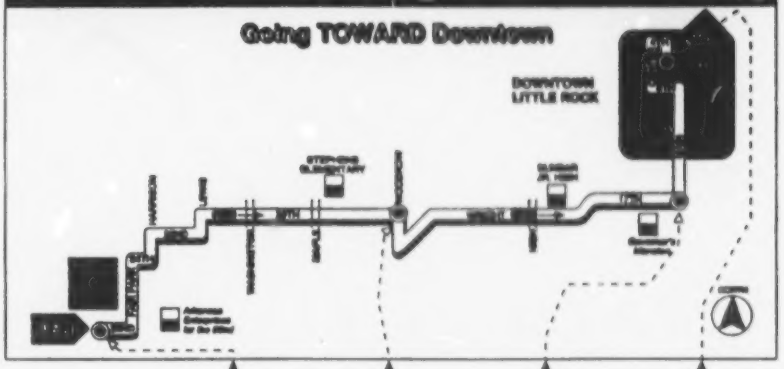
- Use calculator to calculate differences between regular and sale price from an advertisement *(278)*
- Use calculator to determine the discount from an oil bill if paid within 10 days *(308)*
- Calculate miles per gallon using information given on mileage record chart *(321)*

EXAMPLE TASK

Suppose that you took the 12:45 p.m. bus from U.A.L.R. Student Union to 17th and Main on a Saturday. According to the schedule, how many minutes is the bus ride?

16 South Highland 16

Going TOWARD Downtown



	BUS LEAVES from U.A.L.R. Student Union	Bus arrives at 20th & Woodrow	Bus arrives at 17th & Main	BUS ENDS at Capitol & Louisiana
WEEKDAYS				
A.M.	5:36	5:51	6:00	6:09
	6:11	6:25	6:35	6:45
	6:41	6:55	7:05	7:15
	7:11	7:25	7:35	7:45
	7:41	7:55	8:05	8:15
	8:11	8:25	8:35	8:45
	8:41	8:55	9:05	9:15
	9:14	9:27	9:36	9:45
	9:44	9:57	10:06	10:15
	10:14	10:27	10:36	10:45
	10:44	10:57	11:06	11:15
	11:14	11:27	11:36	11:45
	11:44	11:57	12:06	12:15
P.M.	12:14	12:27	12:36	12:45
	12:44	12:57	1:06	1:15
	1:14	1:27	1:36	1:45
	1:44	1:57	2:06	2:15
	2:14	2:27	2:36	2:45
	2:44	2:57	3:06	3:15
	3:14	3:27	3:36	3:45
	3:43	3:56	4:05	4:15
	4:13	4:26	4:35	4:45
	4:43	4:56	5:05	5:15
	5:13	5:26	5:35	5:45
	5:45	5:56	6:07	6:17
	6:11	6:22	6:30	–
	6:46	6:57	7:06	–
SATURDAY				
A.M.	5:36	5:51	6:00	6:09
	6:45	6:57	7:06	7:15
	7:45	7:57	8:06	8:15
	8:45	8:57	9:06	9:15
	9:45	9:57	10:06	10:15
	10:45	10:57	11:06	11:15
	11:45	11:57	12:06	12:15
P.M.	12:46	12:57	1:06	1:15
	1:46	1:57	2:06	2:15
	2:46	2:57	3:06	3:15
	3:46	3:57	4:06	4:15
	4:46	4:57	5:06	5:15
	5:46	5:57	6:06	6:15
	6:44	6:56	7:05	–

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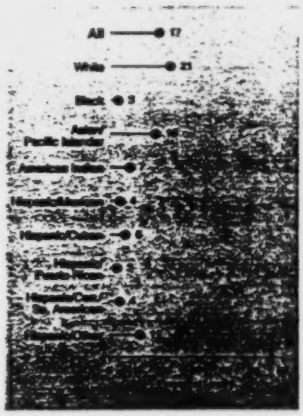
QUANTITATIVE LITERACY, LEVEL 4 (326 TO 375)

One in six of all adults are at Level 4 in Quantitative Literacy and can handle two or more arithmetic operations in sequence.



They can:
perform two or more operations in sequence or a single operation in which the quantities are found in different types of displays, or where the operations must be inferred from the information given or from prior knowledge.

They are likely to succeed at tasks such as:

- Determine correct change using information in a menu *(331)*
- Use information stated in news article to calculate amount of money that should go to raising a child *(350)*
- Use the eligibility pamphlet to calculate the yearly amount a couple would receive for basic supplemental security income *(368)*

EXAMPLE TASK

Estimate the cost per ounce of the creamy peanut butter. Write your estimate on the line provided.

Unit price	You pay
11.8¢ per oz.	1.89
rich chnky pnt bt	
10693	16 oz.

Unit price	You pay
1.59 per lb.	1.99
creamy pnt butter	
10732	20 oz.

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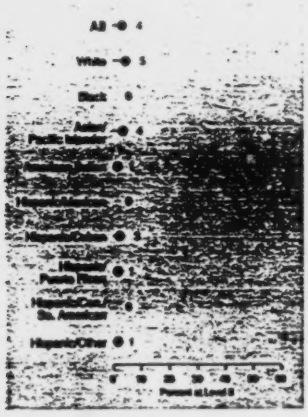
One in 25 of all adults perform at Quantitative Level 5. They can perform multiple arithmetic operations sequentially.



They can:
perform multiple operations sequentially. They can also find the features of problems embedded in the text or rely on background knowledge to determine the quantities or operations needed.

They are likely to succeed at tasks such as:

- Determine shipping and total costs on an order form for items in a catalog *(382)*
- Use information in news article to calculate difference in times for completing a race *(405)*
- Use a calculator to determine the total cost of carpet to cover a room *(421)*

EXAMPLE TASK

You need to borrow $10,000. Find the ad for Home Equity Loans on page 2 in the newspaper provided. Explain to the interviewer how you would compute the total amount of interest charges you would pay under this loan plan. Please tell the interviewer when you are ready to begin.

FIXED RATE • FIXED TERM

HOME EQUITY LOANS

14.25%
Annual Percentage Rate
Ten Year Term

SAMPLE MONTHLY REPAYMENT SCHEDULE

Amount Financed	Monthly Payment
$10,000	$156.77
$25,000	$391.93
$40,000	$627.09

120 Months 14.25% APR

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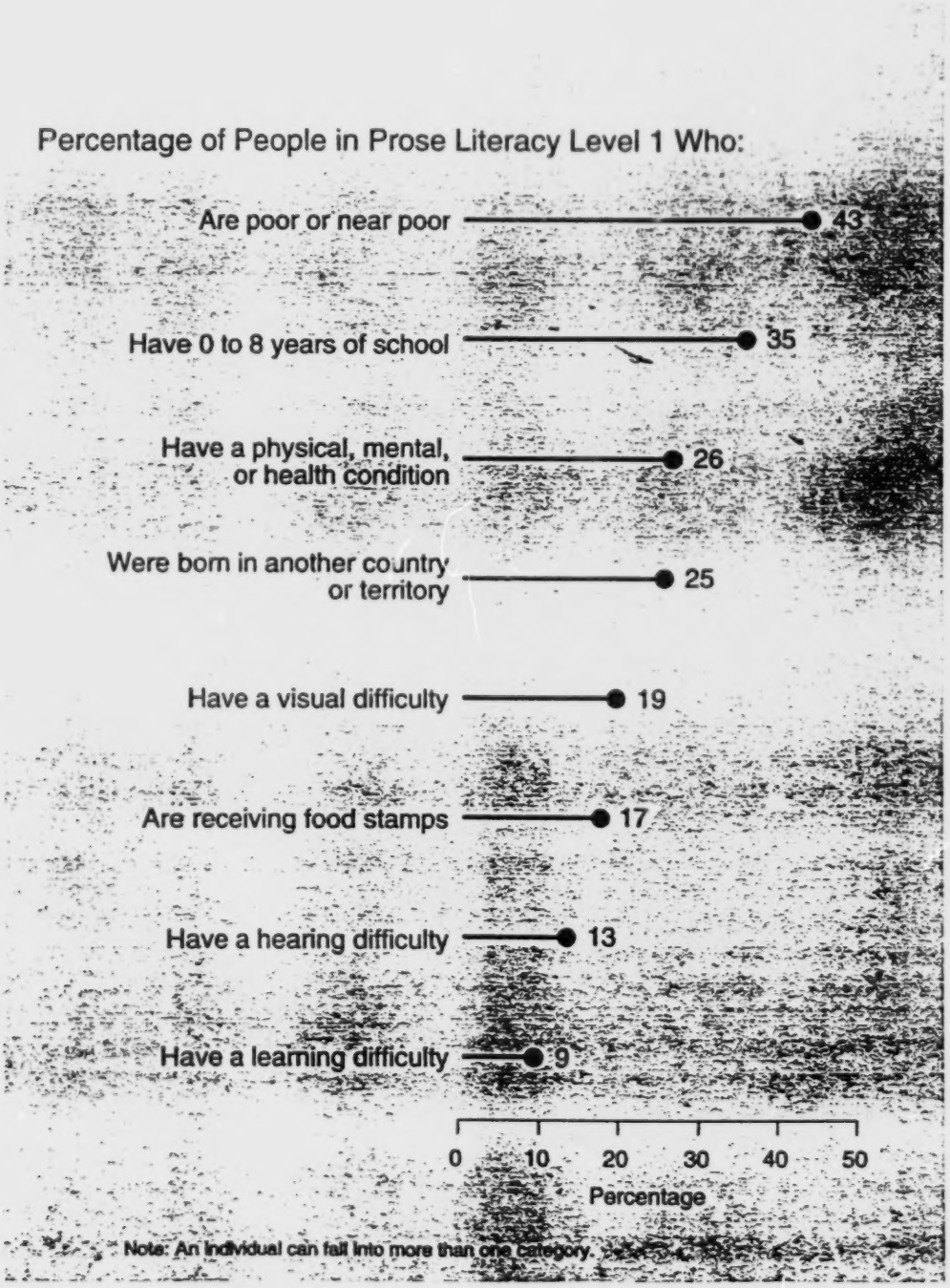
LIMITING PHYSICAL OR MENTAL CONDITIONS AMONG ADULTS IN THE LEVEL 1 POPULATION

Among 40 million adults in the lowest prose literacy level (Level 1), one in four have some kind of physical or mental condition that may impair their literacy proficiency, or make improvement more difficult.



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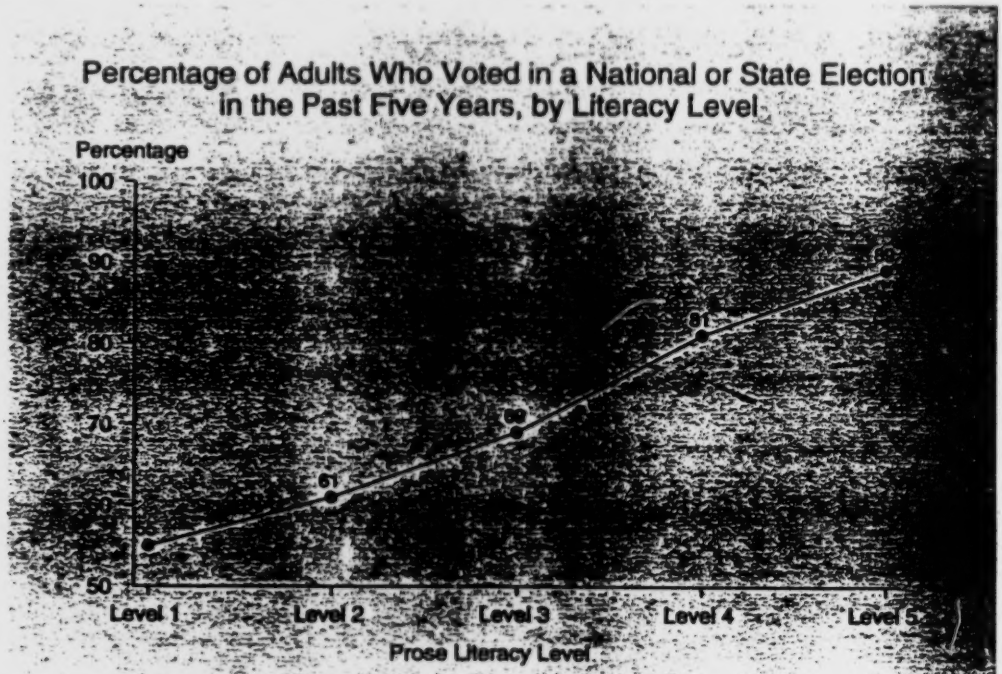
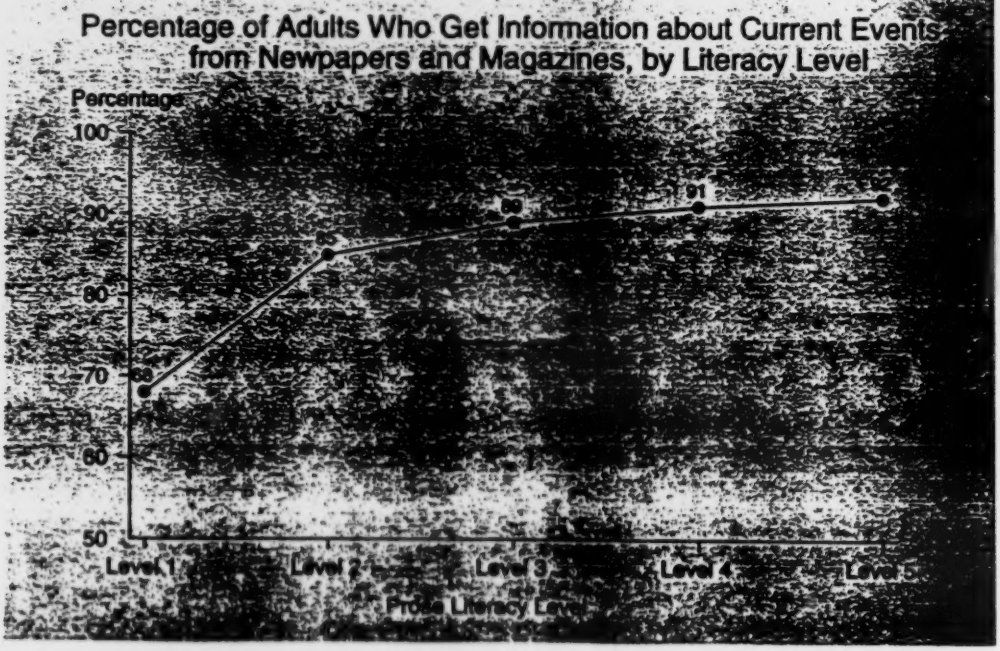
Literacy and the exercise of citizenship in a democracy are related. Higher levels of literacy go hand-in-hand with voting or obtaining information from newspapers and magazines.





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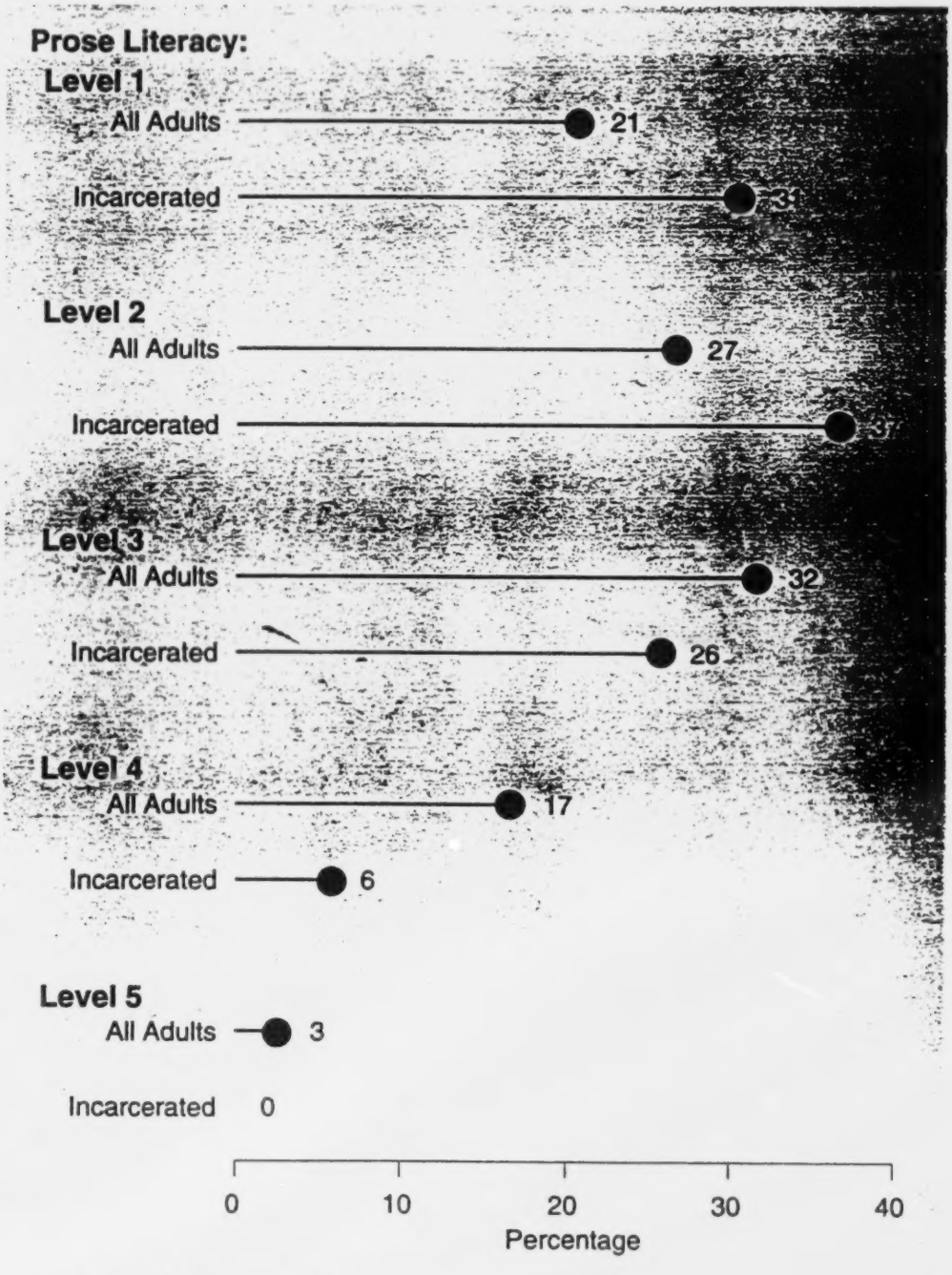
The prison population is considerably less literate than the general population. Almost seven in 10 prisoners are in Levels 1 and 2 of Prose Literacy, compared with less than half of the general population.



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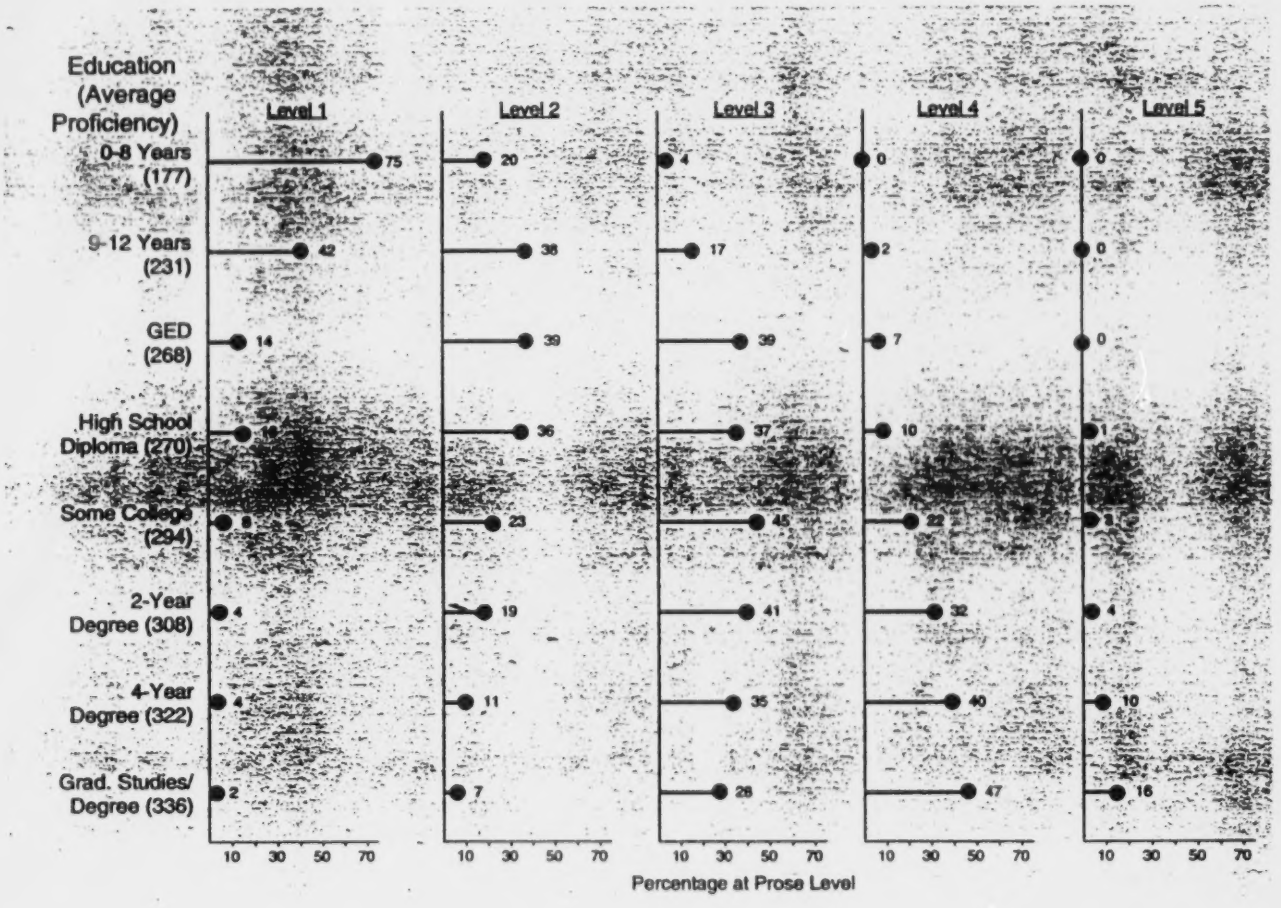
Prose proficiency rises with education level. Three-fourths of adults with between zero and eight years of school are in Level 1, as are four in 10 high school dropouts. Over 75 percent of two-year college graduates, and 85 percent of four-year college graduates, reach at least Level 3. However, just 4 and 10 percent, respectively, reach Level 5.



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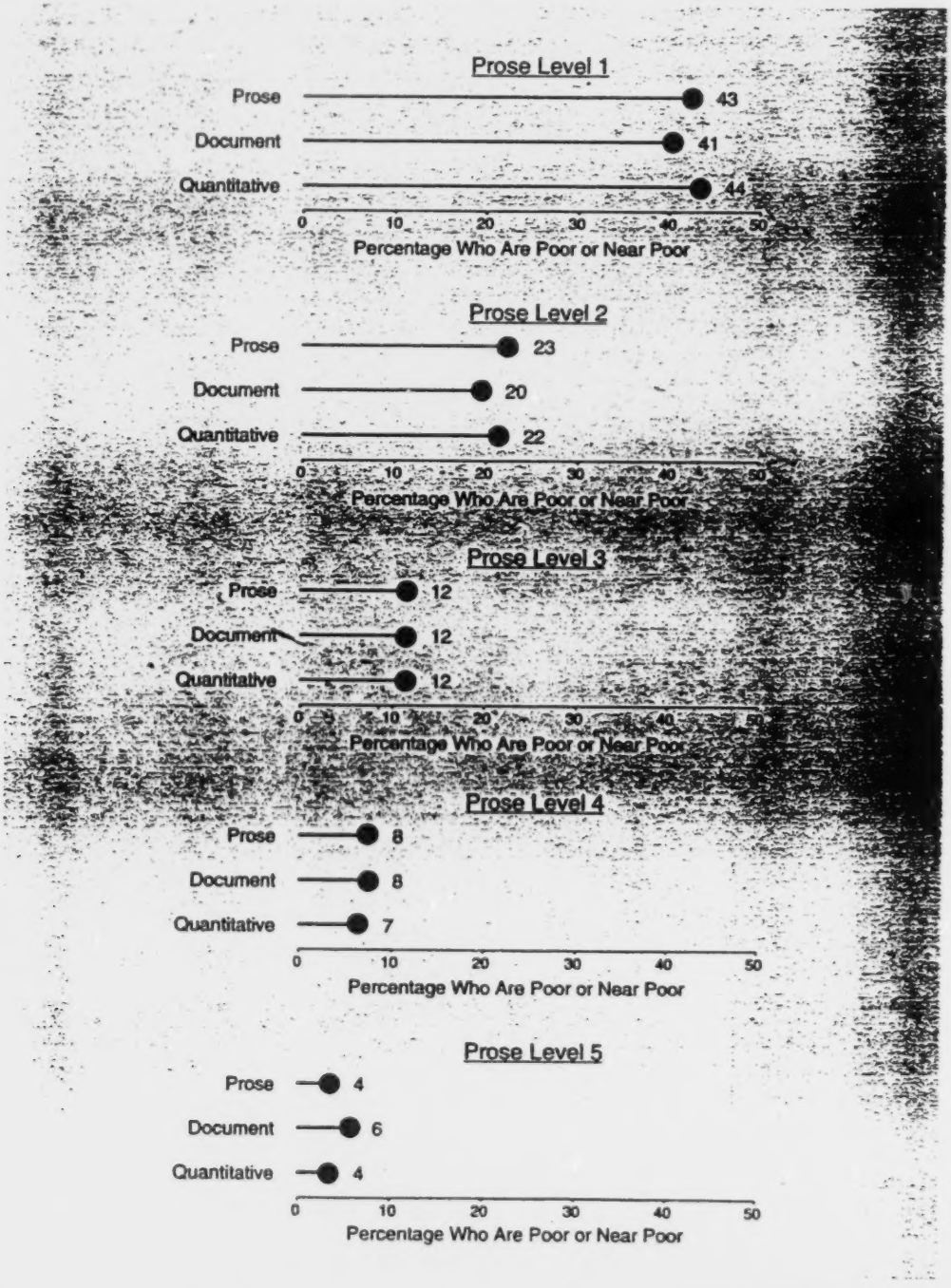
Poverty and literacy are closely related; 43 percent of adults in Prose Level 1 are poor or near poor, compared with just 4 percent in Level 5.



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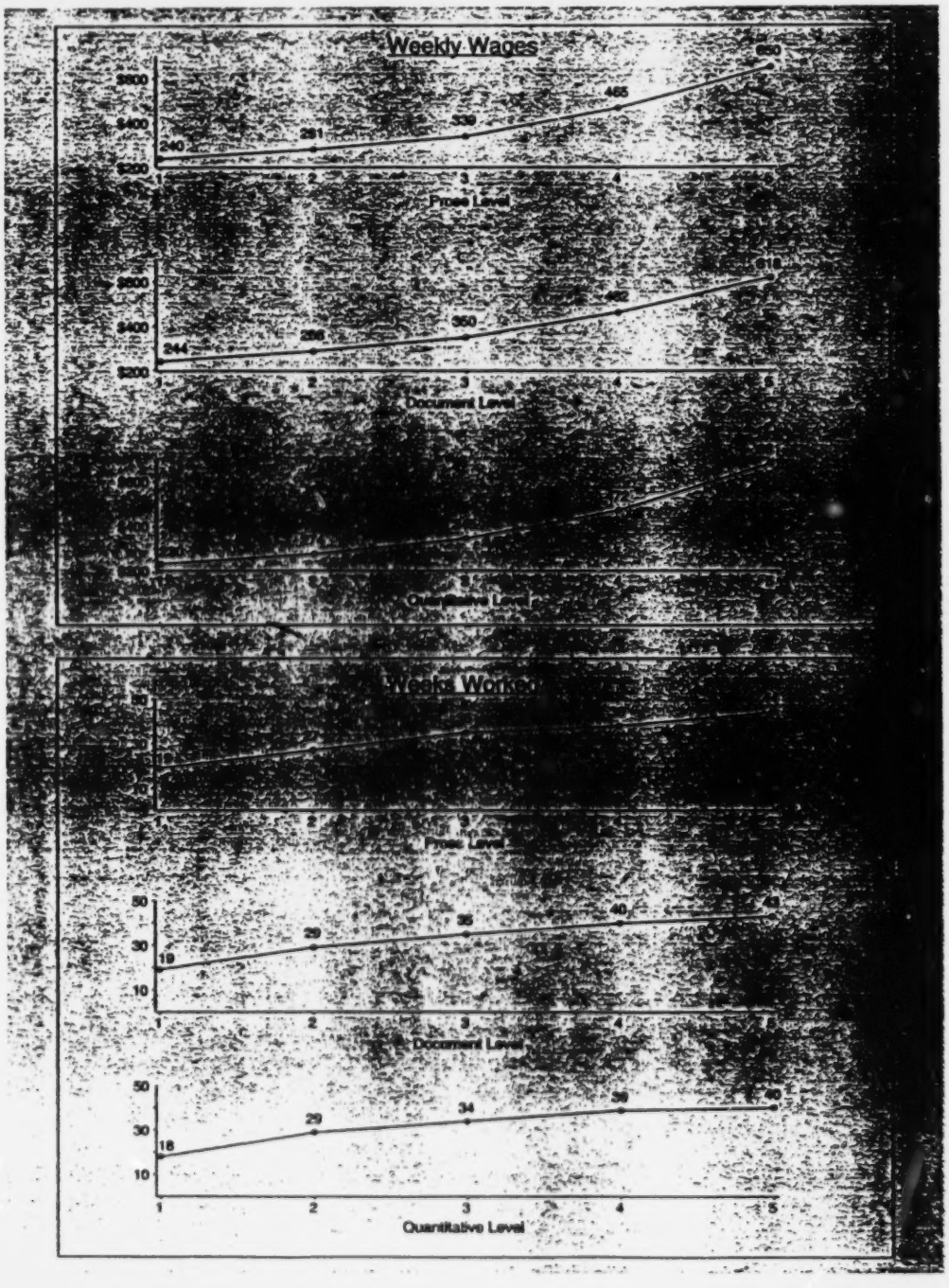
Weekly wages and weeks worked per year rise with literacy level: Adults in Prose Level 5 earn 2 1/2 times adults in Level 1, and work more than twice as many weeks.



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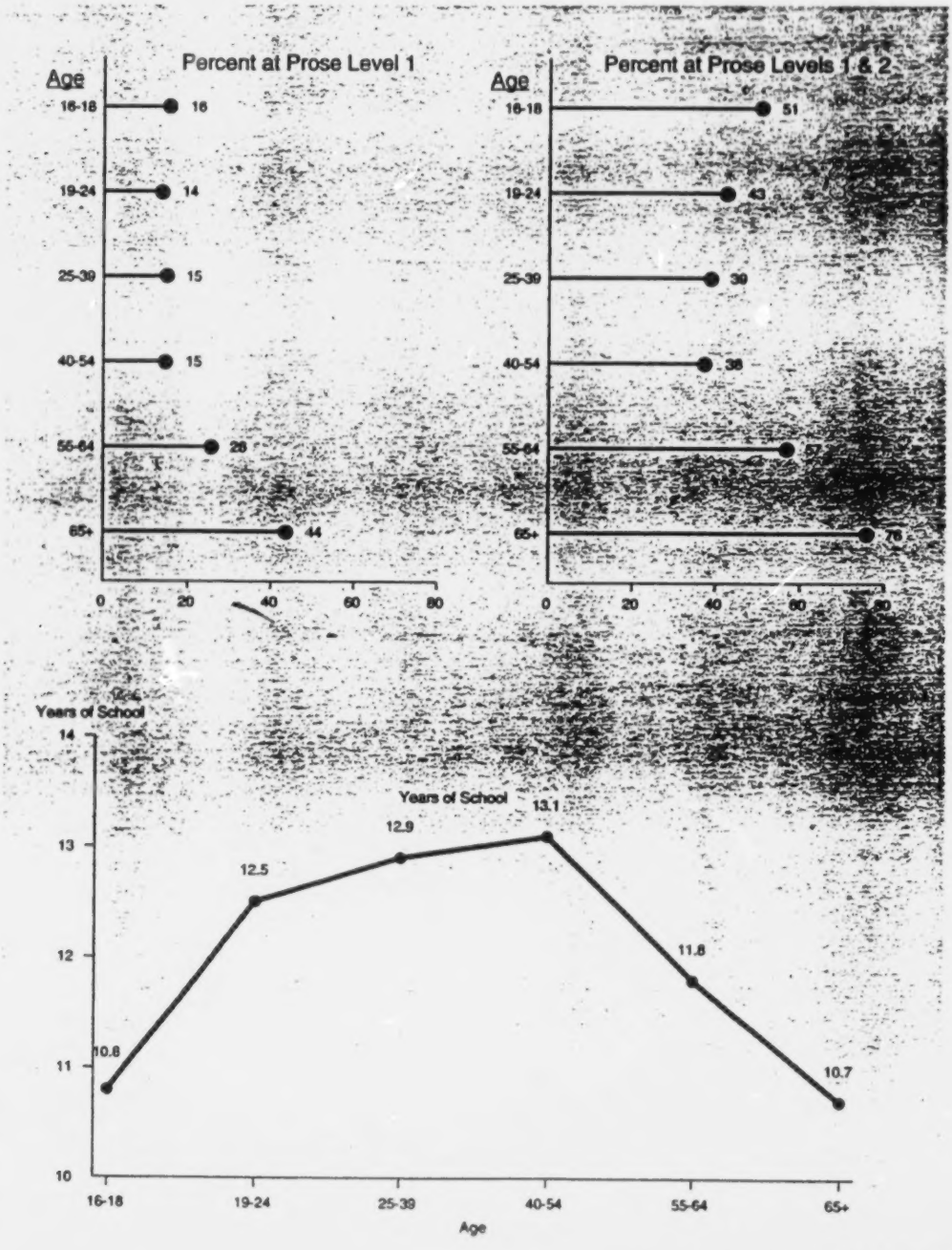
LITERACY AND AGE

While fewer middle-age adults have low literacy levels than young adults, older adults are considerably less literate. However, older adults also have less education than middle-age or young adults.



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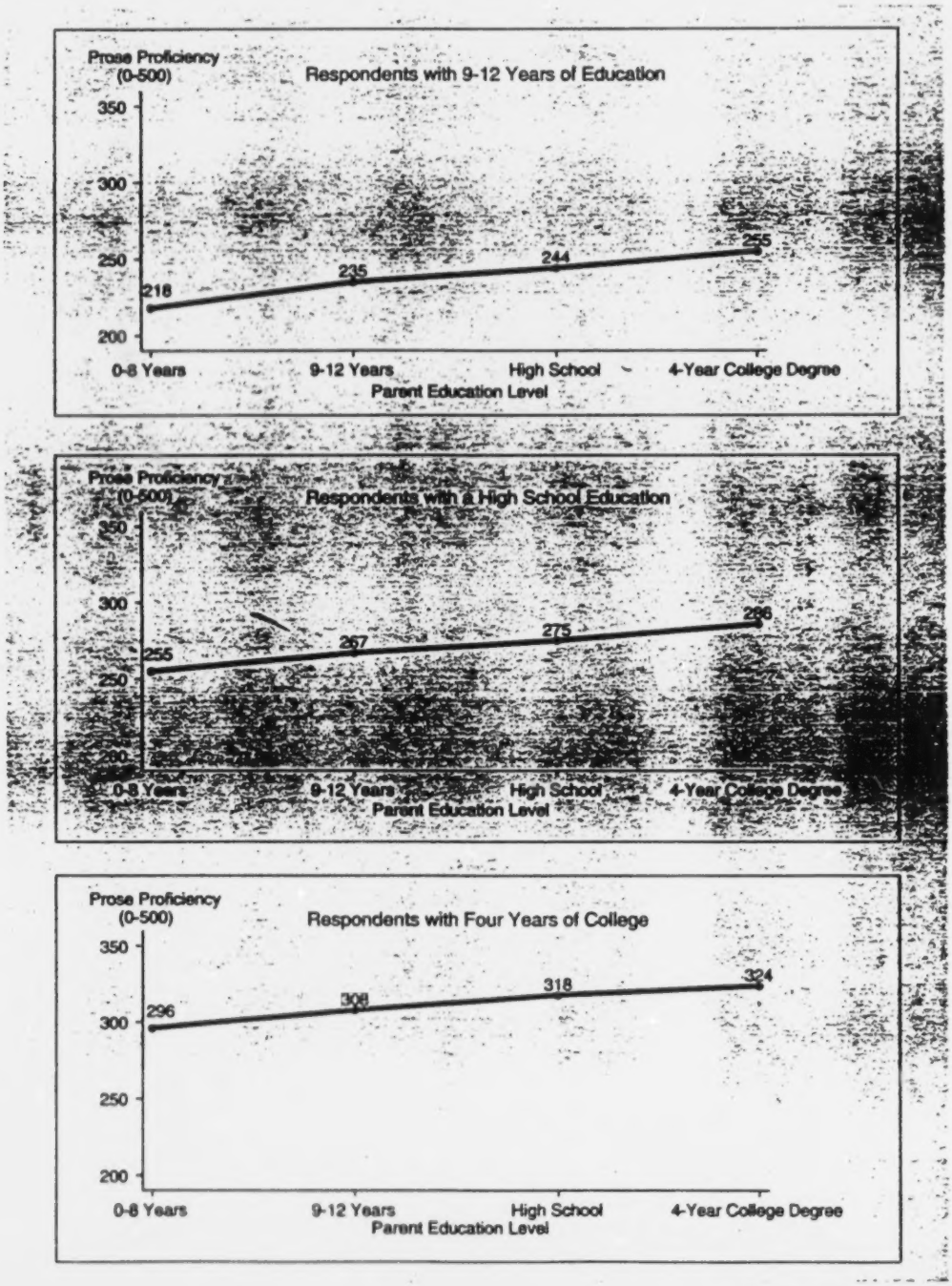
LITERACY AND PARENTS' EDUCATION

Parents' education greatly influences the literacy proficiency levels reached by their children. Even among respondents with similar levels of education, those with better educated parents have higher prose literacy proficiencies.*



* Also true for Document and Quantitative Literacy

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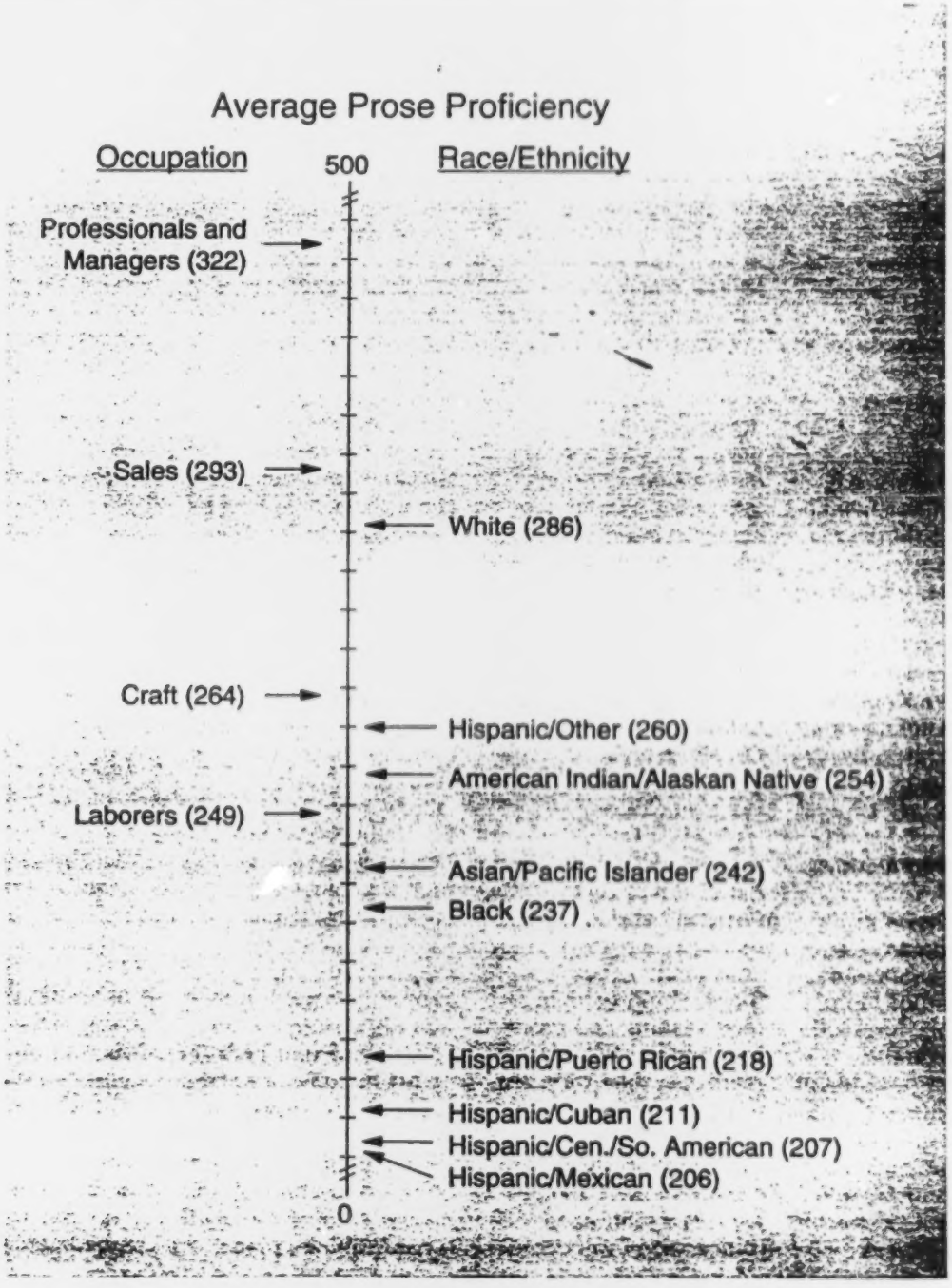
The average prose proficiency of Black, Asian, Hispanic/Puerto Rican, Hispanic/Cuban, Hispanic/Central and South American, and Hispanic/Mexican adults is lower than the average proficiency of all laborers.



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In Conclusion

While the more than forty million Americans performing in Level 1 on all three scales are a diverse group, they are characterized in the NCES report, *Adult Literacy in America*, as at best performing "simple, routine tasks involving brief and uncomplicated texts and documents." Others in Level 1 were described as "unable to perform these types of tasks, and some had such limited skills that they were unable to respond to much of the survey." Current literacy programs are trying to reach this group, primarily individuals who can hardly read at all. Others in this group do display limited literacy skills.

Some idea of how low these proficiencies are can be gained by a comparison with the average proficiency of laborers, where, among the occupations, literacy demands are the lowest. That average of 249 is considerably higher than even those in the top of Level 1.

When designing literacy programs, it is important to remember that many adults in the lowest literacy level are able to decode the printed word — able to read. Their literacy skills are so limited, however, that they may need help to function satisfactorily in even the least demanding of occupations.

It is also important to keep in mind that they are likely to have other difficulties, or that they are dealing with more than one life problem. More than four in 10 are poor or near poor; one in four has a physical, mental or health condition; and one in five has a visual difficulty.

Another 50 million adults are in Level 2. They are characterized in the *Adult Literacy in America* report as "generally able to locate information in text, to make low-level inferences using printed materials, and to integrate easily identifiable information. Further, they demonstrated the ability to perform quantitative tasks that involve a single operation where the numbers are either stated or can be easily found in text."

It cannot be said that these individuals are unable to read, as some reported after the release of *Adult Literacy in America*. But, as this report stated, they "were much less likely to respond correctly to the more challenging literacy tasks in the assessment — those requiring higher-level reading and problem-solving skills. In particular, they were apt to experience considerable difficulty in performing tasks that required them to integrate or synthesize information from complex or lengthy texts or to perform quantitative tasks that involved two or more sequential operations in which the individual had to set up the problem."

The Level 2 range of scores (226 to 275) encompasses the average proficiencies of adults in laborer and craft occupations (although many in these groups exceed the 275 level). Also, 29 percent of sales workers score in the Level 2 range. The question for them is whether they are vulnerable to changes in industry that would require the more advanced proficiencies characteristic of Level 3, or whether they should seek training and education that would make them less vulnerable in an era of downsizing and constantly changing labor markets.

There are, however, limits to what we can conclude about the literacy needs of adults. The National Adult Literacy Survey was the most complete and comprehensive literacy survey made in the United States, and perhaps anywhere. But it was not a study of the levels needed to perform particular jobs, or to be competent consumers, or to function in particular contexts. That would be a very useful companion effort; we would then be able to place occupations or other life activities on the three scales and be able to compare people's proficiencies with the literacy needs and requirements of these occupations.

Although we lack this type of information, there is much we can see clearly from this national assessment about the consequences of lower literacy proficiencies. We can see that this low level proficiency is not uniformly spread throughout the population, and that some populations are much more at risk of low wages and employment difficulty. They are also less likely to participate in community, society, and the political system than others. While one in five adults are at Prose Level 1, this is true for over half of most of the Hispanic subgroups and almost two in five Black adults. This contrasts with one in seven White adults.

While one in four White adults are at prose Level 2, 37 percent of Black, 39 percent of American Indian, and 32 percent of Hispanic/Puerto Rican adults are at this level. Three out of four, or more, of some minority populations are at Levels 1 and 2. These much lower literacy levels are a serious obstacle to achieving economic parity and equal participation in the

society. While we do not know the literacy requirements of particular activities from this large scale assessment, we do know that there is a very close relationship between literacy proficiency and success in a variety of pursuits, as can be seen in the pages of this report.

- Over two in five adults in Prose Level 1 are poor or near poor, as are over one in five who are in Level 2. Only one in 20 in Level 5 are poor or near poor.

- The average weekly wages of those in Prose Level 1 are $240, compared to $281 in Level 2, $339 in Level 3, $465 in Level 4, and $650 in Level 5.

- Forty-five percent of those in Prose Level 1 have not voted in a state or national election during the previous five years, compared to 11 percent in Level 5.

These, and other demonstrated relationships in the full report, established clearly that literacy proficiency serves as a currency in economic society, a comparison made by the study director, Irwin S. Kirsch. The more literacy you have, the greater the economic success, and the greater the participation in the political system. This is a matter on which the data from the survey are unequivocal.

While our greatest concern is with increasing this currency in the lower level literacy groups, the benefits of increasing literacy proficiency are demonstrable for the higher groups as well. Improving literacy is not solely a matter of fighting poverty and dependence. The definition of literacy for this assessment was not only to "function in society," but also "to achieve one's goals," and "to develop one's knowledge and potential." That requires continued opportunity to increase one's literacy, and to advance in occupation, income, and other aspects of life.

While formal education is related to increased literacy as shown in this and other surveys, literacy skills play a powerful role in improving educational opportunities. Those who read a lot in school are better readers; adults regularly engaged with the printed word are more literate. And literacy increases for years after formal schooling is completed, pointing to how use begets proficiency. Those who continue to read and grow will not lament as did Samuel Johnson: "In my early years I read very hard. It is a sad reflection, but a true one, that I knew almost as much at eighteen as I do now."

The findings of this literacy survey are not just for policymakers and program designers then; they should speak to individuals, both about the power of being highly literate, and the personal practices associated with getting there. One in five adults who scored in Prose Level 1 say they never read the newspaper — true of only 1 percent in Levels 4 and 5.

While the amount of schooling correlates, as expected, with literacy levels, literacy varies widely among people with the same number of years of schooling. This is both because the quality of their schooling varies and because some continue to learn in life, while others do not. Whichever, the practice of expressing adult literacy in terms of school grade equivalents is a prevalent but highly misleading practice. Having gone to school a year at a time, it seems that people — those in education, in policy, in executive positions, in creating literacy programs, and using literacy tests — can think only in terms of grade equivalents. Let's look at the prose skills of those who graduated from high school, but went no further:

16% are in Level 1
36% are in Level 2
37% are in Level 3
10% are in Level 4
1% are in Level 5

When people speak of a 12th grade literacy level, what can that possibly convey? True, it takes a shift in thinking to embrace measured literacy proficiency, as done in this assessment, and to use levels and scale scores to describe performance, but not to do so leads to wrong answers and misguided policy. As we said at the outset, to work in this field one must take some time to become literate about literacy.

The difference between school-based measures of reading and the profiles of adult literacy used in this survey goes beyond even the two factors cited above. Typical instruction in school reading is centered on decoding words and simply comprehending what is read, usually literature. Literacy in adult life means considerably more than that. The printed word is constantly serving up problems to solve in negotiating all aspects of life. We can't use the results of this literacy survey to measure the quality of schooling until schools are teaching, more directly, what such literacy surveys are measuring.

This difference between school reading

achievement and life literacy skills can be illustrated using data collected in 1985 in the Young Adult Literacy Survey, also carried out by Educational Testing Service, with a grant from the National Center for Education Statistics. That survey used the same definition of literacy, and the same three scales, as the current one. In addition, however, young adults were also given the in-school reading assessment used by the National Assessment of Educational Progress (NAEP) for 11th graders. The results can be compared. NAEP, at that time, defined "adept" readers as those with scale scores around 300 (on a 0 to 500 scale). Adept readers are *good* school readers who

> can understand complicated literary and informational passages . . . they can also analyze and integrate less familiar materials and provide reactions to and explanations of the text as a whole.

A band of readers around the adept level, those scoring from 275 to 325 on the NAEP scale, could also be assessed on the document scale. While 48 percent of these good NAEP readers scored from 275 to 325, the rest were widely dispersed. Twenty-three percent scored below the 275 level, where only relatively simple tasks can be performed, such as locating information on a pay stub, entering data on a deposit slip, and matching items on a shopping list to coupons. Only about 12 percent scored up at the top of the document literacy scale (350 or higher), succeeding at complex literacy tasks.

It is no wonder that schools often turn out graduates they think meet reading standards, while employers (or prospective employers) of some of these same students find them grossly deficient at the literacy tasks demanded by the workplace. The schools and the employers are not talking about the same kinds of tasks or competencies.

The question we need to address is where the responsibility should lie for instilling this broader view of literacy, and how communication between schools and employers can be improved. Further, the training provided to new employees in America is about the most meager of the countries with which we compete. That is also part of the literacy problem in America.

•••

This first comprehensive assessment of the literacy skills of adults in the U.S. is a giant step in creating the knowledge base for moving toward the goal set by the President and the governors in 1989, that all Americans will be literate by the year 2000. Beyond that we need to spend some time making our own judgments about what this mass of data means . . . as individual citizens, as educational institutions, as employers, and as public officials. Now that we know the literacy proficiency of individuals, we need to know more about such things as the literacy requirements of jobs and what is needed to be a competent consumer. This too can be gleaned from applying existing techniques such as job literacy analysis.

Literacy does not come easily. And a comprehensive survey of our state of literacy does not translate to a couple of sound bites. This report attempts to boil down this mass of data as much as possible. A more complete story is in *Adult Literacy in America: A First Look at the Results of the National Adult Literacy Survey.*

PRINT USE PROFILES

By Judith Shaul Norback
and Garlie A. Forehand

I. General Introduction

The purpose of this paper is to examine the literacy demands of jobs. Recent research has yielded increasing understanding of the levels and processes of adult literacy. The National Adult Literacy Survey (Kirsch & Jungeblut, 1986, Kirsch, Jungeblut & Campbell, 1991) analyzes skills of prose, document, and quantitative literacy (PDQ), based on a cognitive and linguistic analysis of tasks used to assess levels of adult literacy (Ibid., 1991). PDQ characterizes literacy tasks in terms of the increasing levels of processing required to perform progressively more complex tasks with a given set of materials. Examples of PDQ levels and exemplars of those levels are given in Table 1. This paper uses the PDQ framework to focus on the literacy demands of jobs.

Norback and her colleagues (1990, 1994, 1995) have collected data on the literacy requirements of real jobs. The data includes literacy materials and tasks deemed important by job incumbents and supervisors. An example of material used in a specific job, in this case, food service worker, is presented in Figure 1. The tasks that a worker performs using that material include:

-- reading and following directions on production sheets

-- tracking, calculating or recording number of portions prepared, served, or left over.

This paper links actual job literacy requirements with prose levels, document levels, and quantitative levels. The resulting literacy profile is referred to as a *print-use profile*. In a print-use profile, job literacy tasks and materials are assigned to levels. The five-level classification system is modeled on the five levels of PDQ. Unlike PDQ, print-use profiles are not based on statistical performance data. Instead, the decision guidelines shown in Table 2 are used to assign the job literacy tasks and materials to gradations within each of the five levels.

This paper will look at print-use profiles for six jobs:

1. Entry-level secretary [Entry-level secretaries provide administrative support to an individual or group of people. They word process, edit and proofread letters, tables and graphs. They maintain files, distribute materials, and answer phones.]

2. Food service worker. [Food service workers prepare and serve hot and cold food. They also set up and clean up food displays.]

Figure 1: Job Literacy Analyis Food Production Order

FOOD SERVICE RECORD (6A)

LOCATION 01 BOARD PLAN - PA
DEPARTMENT DELI BAR
Production Sheet (2)
SERVICE RECORD NUMBER 018963-2270

FRIDAY 02-03-89 LUNCH MENU NUMBER 1022 PATRON FORECAST 1094

SELL PRICE	NAME	YIELD AMOUNT REQUIRED	PORTION SIZE	NUMBER OF PORTIONS: FORECAST TO PREPARE	PREPARED	LEFT OR CUST CNT WHEN OUT	SERVED	REQUIRED NEXT TIME
	CHEESE-AMERICAN DELI BAR	8 LB 4 OZW	1 OZW	132	240	93	147	
	CHEESE-SWISS-DELI	4 LB 5 OZW	1 OZW	69	120	—	120	
	CHEESE-PROVOLONE-DELI	5 LB 3 OZW	1 OZW	83	120	—	120	
	SALAMI-ROUND		1 1/2 OZW	9	0	—	—	
	BOLOGNA-ROUND	3 LB 3 OZW	1 1/2 OZW	34	40	10	30	
	LIVERWURST	1 LB 6 1/2 OZW	1 1/2 OZW	13	10	—	10	
	ROAST BEEF-DELI	34 LB 3 1/2 OZW	1 1/2 OZW	345	800	65	735	
	LETTUCE - DELI		1 LB	14				
	ONIONS SLICED - DELI		1 LB	2				
	TOMATOES SLICED -DELI		1 LB	25				
	EGG SALAD	5 LB	2 OZW	40				
	TUNA SALAD 85	19 LB 14 OZW	2 OZW	159				
	TURKEY SALAD 85	7 LB 8 OZW	2 OZW	60				

(6C)

GRILL Lunch

MENU ITEM	Standard Portion Number	Size of Portion	Raw Quantity Required	Number of Portions: To Prepare	Left Over Cooked	Served	INSTRUCTIONAL PRICE
HAMBURGER	B-51	5 OZ	8#	25			BATCH COOK
CHEESEBURGERS	B-32	5 OZ	6 1/4#	24			1/2 OZ OF CHEESE
STEAK SANDWICHES	HR	4 OZ	20#	80			2 SLICES CHEESE STEAK
PORK ROLL	HR	2 1/2 OZ	1/2#	3			BATCH COOK
GRILLED CHEESE	C-15	2 OZ	1 1/4#	10			BATCH COOK
CHICKEN FILET	HR	3 OZ	1 1/2#	8			BATCH COOK
FRIED CHICKEN	HR	1 PC		10			BATCH COOK
HOT DOGS	HR	4 OZ	4 OZ	1			BATCH COOK
FRENCH FRIES	V-11	3 OZ	4 3/4#	25			2 OZ CHEESE SAUCE FOR CHEESE FRIES
ONION RINGS	V-11	3 OZ	3 OZ	1			BATCH COOK
GRILL SPECIALS:							
Italian Sausage	1 EA						
w/ PEPPERS & ONIONS	1 DOZ						

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*TABLE 1: EXEMPLARS OF PDQ LEVELS**
Difficulty Values of Selected Tasks Along the Prose, Document, and Quantitative Literacy Scale

	PROSE	DOCUMENT	QUANTITATIVE
LEVEL 5	Interpret a brief phrase from a lengthy news article.	Using a table depicting information about parental involvement in school survey to write a paragraph summarizing extent to which parents and teachers agree.	Using information in news article, calculate difference in times for completing a race.
LEVEL 4	Explain difference between two types of employee benefits.	Use bus schedule to determine appropriate bus for given set of conditions.	Using information stated in news article, calculate amount of money that should go to rising a child.
LEVEL 3	Read a news article and identify a sentence that provides interpretation of a situation.	Use sign out sheet to respond to call about resident.	Using a calculator, determine the discount from an oil bill if paid within 10 days.
LEVEL 2	Locate two features of information in sports article.	Locate eligibility from table of employee benefits.	Determine difference in price between tickets for two shows.
LEVEL 1	Identify country in short article.		Total a bank deposit entry.

* Source: U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992. As referenced in Kirsch, Jungeblut, Jenkins & Kolstad, 1993.

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TABLE 2: PRINT- USE PROFILE DECISION GUIDELINES			
	PROSE	DOCUMENT	QUANTITATIVE
LEVEL 5	summarize multiple sources	troubleshoot using a schematic or intersected list	
	generate answer for combined list	put into or change into standard format or know when something is out of line	
			track quantities from multiple sources
LEVEL 4	generate/create documents of prose	create intersecting lists	use background knowledge to interpret quantitative results in different types of displays
	edit intersecting list	infer using a schematic, an intersecting list, or a nested list, or create a combined list	conversion
	proofreading nested list or intersecting list	infer using a form or combined list	multiple operations with more than two numbers
LEVEL 3	proofread simple or combine list	generate (write or enter) information	plot data on a graph
	look up information in standard reference	read and/or match a nested list or schematic	multiple two-number operations
	locate information and use it to generate response	read an intersecting list or a diagram	
	generate description of what was seen or heard or told	read and/or match a simple or combined list	two or more sources of information
LEVEL 2	copy/transfer information	read a combined list	
	read prose of technical nature (e.g., MSDS sheet)	generate a simple list or cycle through a form for multiple pieces of information	compare numbers on intersecting list
	read job-specific vocabulary (e.g., teriyaki monkey dish)	read a simple list	use units: x per y
	read prose in particular order	copy or transfer information	
LEVEL 1			one computation
	read sentences with abbreviations and symbols		write or keypunch a number or read a percent, fraction, or a data in numbers
	read more complex words such as "deluxe," "Hanover"		read a number or time
	read common words such as "in," "and"		count a number

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3. Mid- to executive-level secretary[1]. [Mid- to executive-level secretaries provide administrative support to an individual or group of people. They create systems for easy retrieval on the computer or word processor, and word process, edit and proofread letters, tables and graphs. They prepare presentation materials, arrange meetings and schedule appointments. Higher-level secretaries also answer phones, maintain files and distribute materials.]

4. Nurse assistant. [Nurse assistants measure patients' vital signs, height, weight, food intake and output. They record the information on charts and graphs. Nurse assistants also review patients' schedules with their patients and record their patients' daily activities.]

5. Quality control. [Quality control workers help to ensure product quality and work environment cleanliness. They run laboratory tests and procedures and observe practices used by other employees. They keep detailed records of their results and observations.]

6. Sanitation. [Sanitation workers clean and sanitize the production equipment. They mix the chemicals they use and disassemble and assemble equipment that they clean.]

II. Use Profiles

The prose-document-quantitative (PDQ) approach to adult literacy is based on a cognitive and linguistic analysis of tasks used to assess levels of adult literacy (Kirsch & Jungeblut, 1986, Kirsch, Jungeblut, & Campbell, 1991, Kirsch, Jungeblut, Jenkins & Kolstad, 1993). PDQ characterizes literacy tasks in

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[1] The criteria used to distinguish between entry-level secretaries and mid to executive-level secretaries included current job title, job title of next higher and next lower positions, and amount of experience (Norback, Wilson & Wattay, 1990).

terms of the increasing levels of processing required to perform progressively more complex tasks with a given set of materials. The process used to analyze actual workplace materials and tasks using the PDQ framework is described in Appendix 1.

III. The Findings

For each job grouping that was analyzed, the range of the instances, or materials used for specific tasks, will be described.[2] A concrete example from the actual job materials and tasks will be given for the lowest and the highest ends of the range. Then the continuity of the data will be noted--that is, whether the PDQ print-use data tended to group into the levels with no breaks, or whether breaks occurred as the job materials and activities were matched to the PDQ levels. Finally, for each job grouping, the mode or level with the highest frequency will be described, along with the number of instances that the mode represents.

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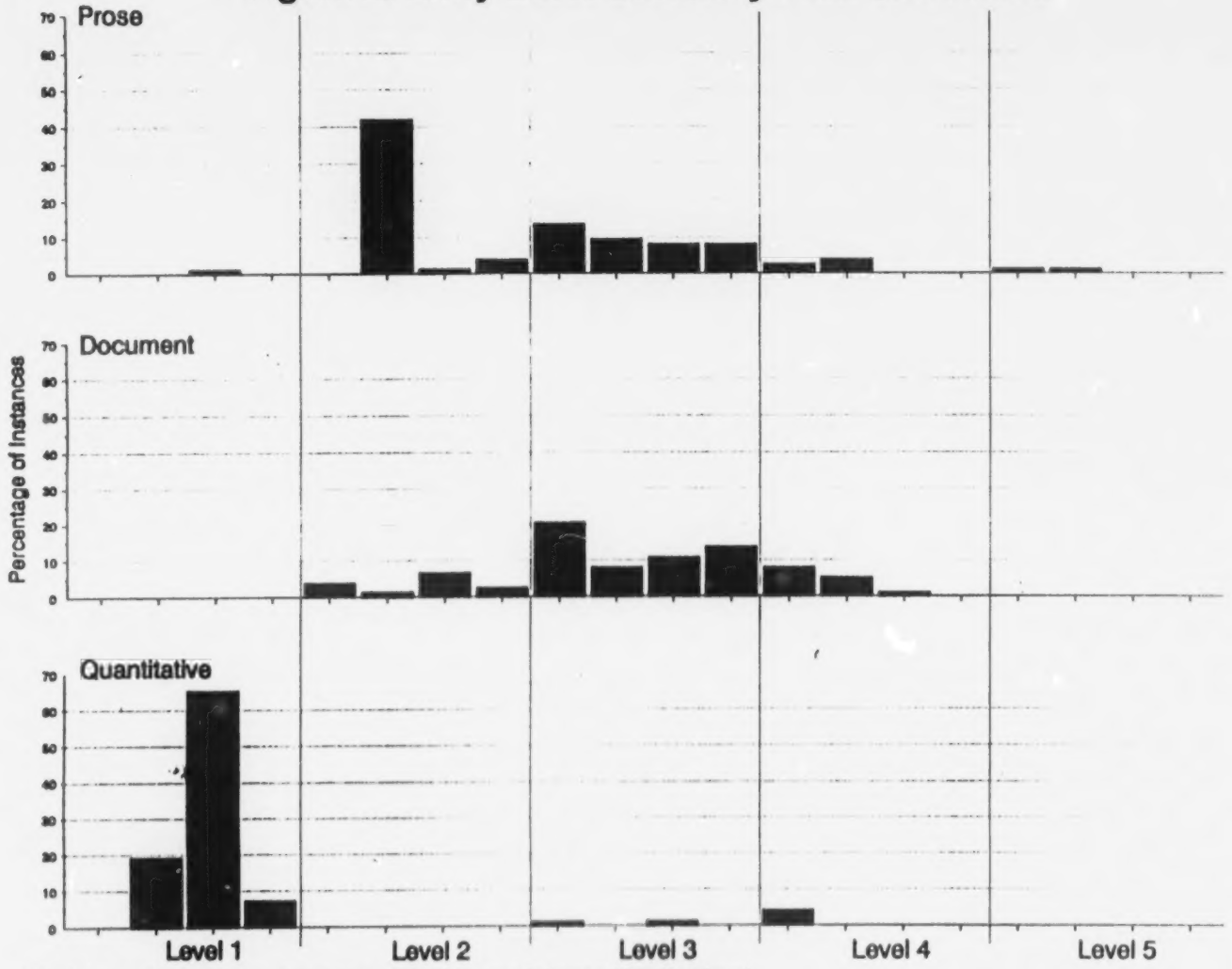
[2] The number instances analyzed for each job grouping is: entry-level secretary, 286 (147 instances of prose, 72 document, 67 quantitative), food service worker, 52 (13 prose, 22 document, 17 quantitative), mid-to-executive level secretary, 419 (142 prose, 141 document, 136 quantitative), nurse assistant, 111 (40 prose, 40 document, 31 quantitative), quality control, 78 (26 prose, 26 document, 26 quantitative), and sanitation, 26 (8 prose, 10 document, 8 quantitative).

Entry-Level Secretary

Prose. The prose demands for the job grouping of entry-level secretary range from the higher region of level 1 to the lower region of level 5. An example of the low end of the range is reviewing diaries, appointment books, calendars and tickler files. An example of the high end of the range is compiling summary reports based on notes taken over a period of time or data from one or more sources (e.g., a monthly report). As seen in Figure 2, the data are not continuous; there are two breaks. One outlier shows up at level 1, and two other outliers occur at level 5. The former is described above. The latter include compiling summary reports, and processing (opening, prioritizing, sorting, and answering) the mail. The most frequently occurring examples of entry-level secretary prose print use occur in level 2, for example, maintaining the existing files. The mode represents 30 different instances, or material-and-task combinations performed on the job.

Document. The document print use of entry-level secretaries ranges from level 2 (see Figure 2), for example, transferring information directly from handwritten receipts to standard requisitions and invoices, to level 4, for instance, compiling summary reports from two or more monthly reports. The data is continuous, and the mode, which represents 15 instances, falls in level 3. An example of the most common use of documents is proofreading checklists, worksheets, and time records.

Figure 2: Entry-Level Secretary Print Use Profile*



*Each bar reflects the level and one of the four gradations within that level. Guidelines for the four gradations within each level are included in Table 2.

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Quantitative. For entry-level secretaries, the use of print for quantitative purposes ranges from level 1 to the lower portion of level 4 (see Figure 2). An example of the lower level is distributing company guidelines, policies, and procedures to the appropriate departments. The higher level is represented by performing calculations on requisitions and invoices. There are three breaks in the range for the quantitative aspect. The outliers occur at levels 3 (e.g., revising charts and graphs in reports and newsletters and checking the calculations on travel vouchers and purchase orders), and 4, (e.g., performing calculations), as described above. The quantitative mode for this job grouping, reflecting 44 instances, is in the upper range of level 1. An example of the most frequent type of activity is processing or filling out form letters or memos.

Food Service Worker

Prose. The prose print use of food service workers is spread from level 1 to relatively high in level 2. An example of the lower level is reading and following instructions on a chart or job description. The higher level includes activities such as reading the hazardous material sheet. The distribution of the food service worker prose data is continuous, as shown in Figure 3. The mode, representing four instances, is relatively high in level 1, and includes, for example, reading and following the directions on food production orders.

Document. Food service worker document print use is shown in Figure 3. The data ranges from reading a label, at level 1, to recording portions prepared, served, or leftover on the food production order, at the top of level 3. There are

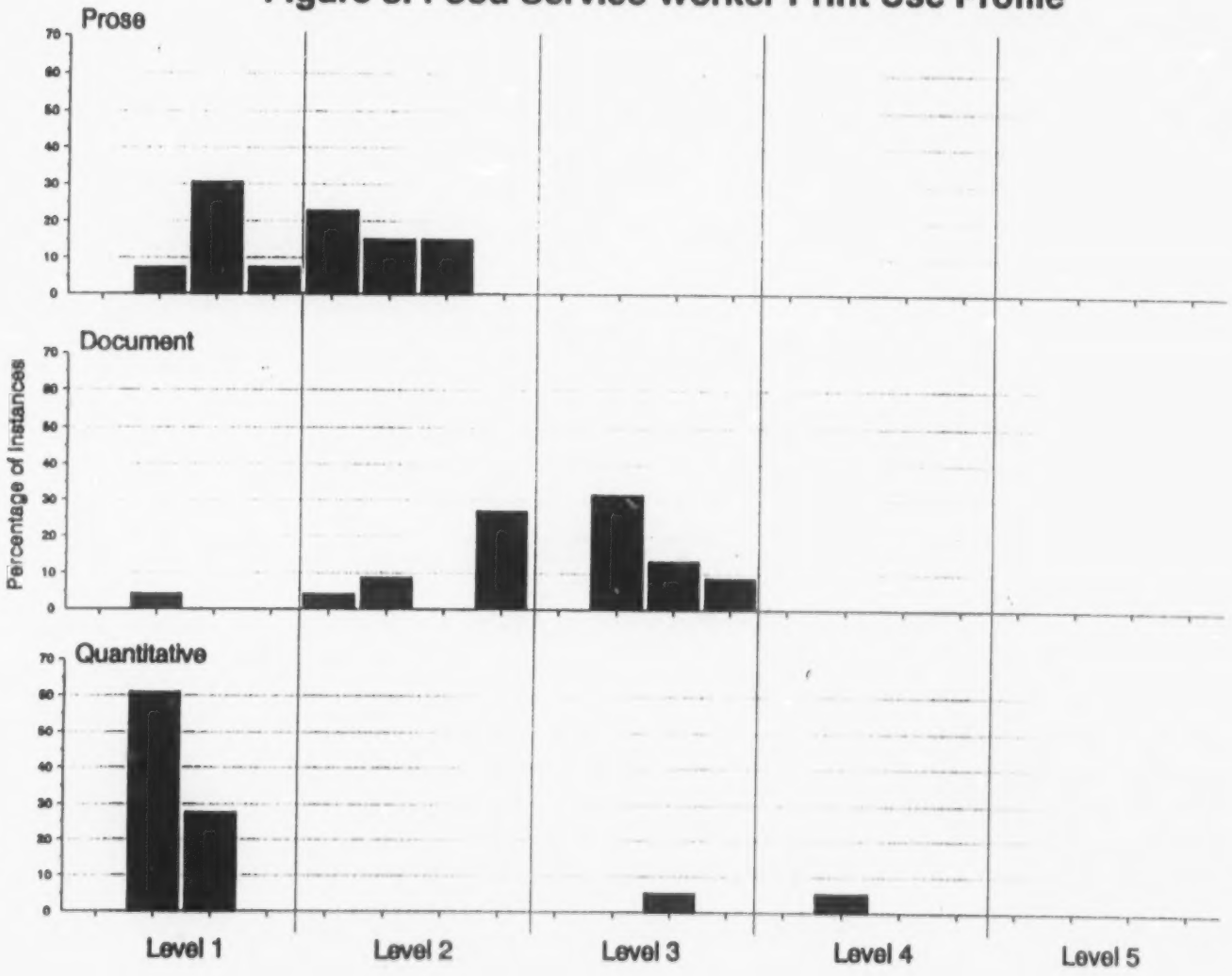
three breaks in the data, with the most prominent outlier occurring at level 3, for instance, reading and following the directions in a recipe to prepare items. The most common activity reflects seven task-and-material combinations and falls in level 3.

Quantitative. Quantitative food service worker print use (see Figure 3) ranges from reading and following instructions on job descriptions (the middle of level 1) to modifying the recipe as needed to accommodate more or fewer people (level 4). There are two prominent outliers appearing at levels 3 and 4. The first outlier is tracking and calculating for the food production order the number of portions prepared, served, or left over. The second outlier is the conversion described above. The mode for food service workers' quantitative print use, reflecting 11 cases, falls in level 1. This level represents reading a label or reading a menu.

Mid- to Executive-Level Secretary

Prose. As shown in Figure 4, the prose use of mid- to executive-level secretaries ranges from relatively high in level 1 to level 5. The two ends of the range are indicated by, respectively, reading requisitions and invoices to check calculations, and compiling summary reports based on logs taken over a period of time. The data has two breaks. Outliers include drafting correspondence (level 4) and compiling summary reports (level 5). The mode, representing 25

Figure 3: Food Service Worker Print Use Profile



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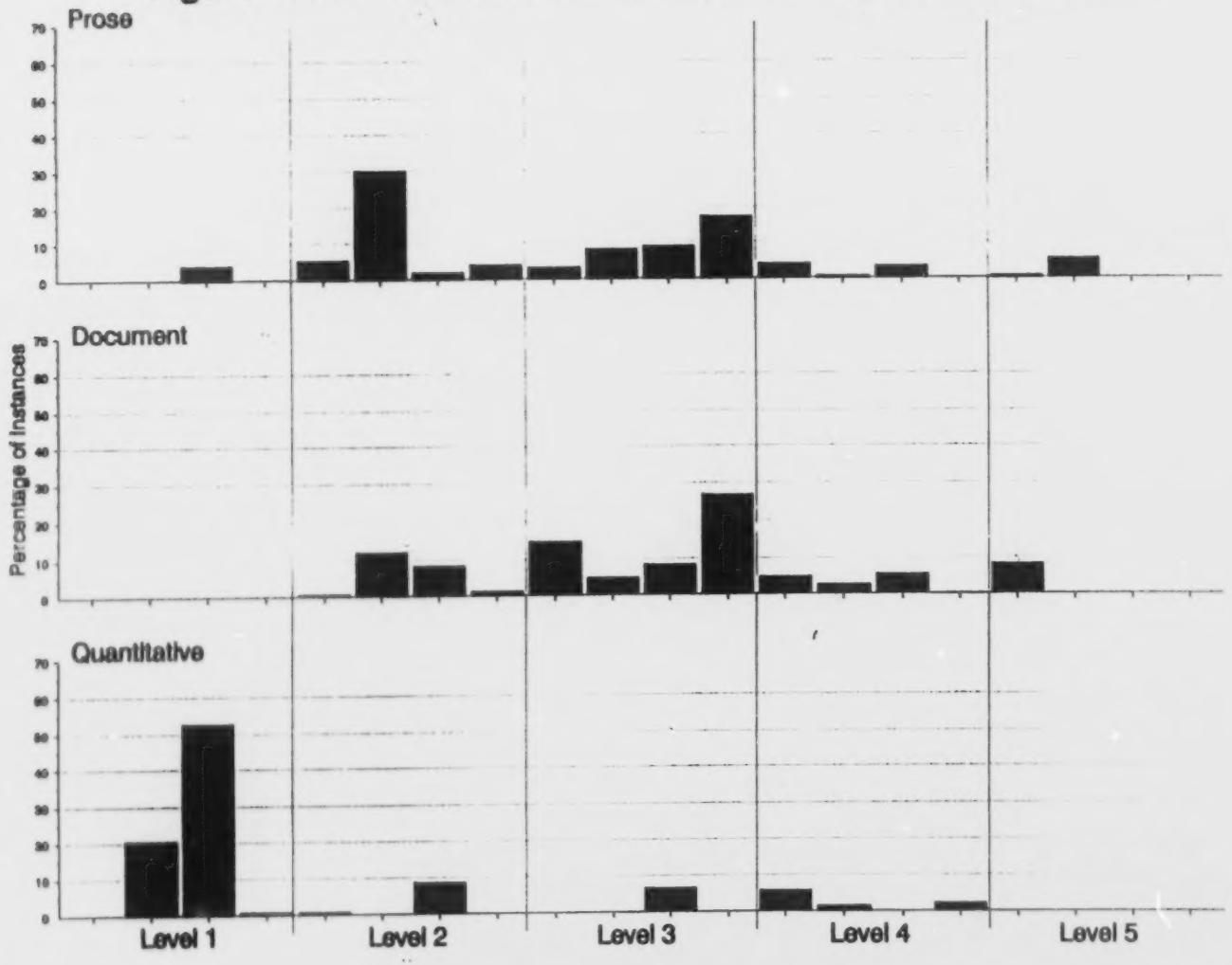
instances, occurs in the middle of level 2. This level is represented by creating and maintaining logs and records.

Document. Document print use of the higher-level secretaries ranges from level 2 to the lower portion of level 5, or, for instance, from making reservations with travel agencies and hotels, to verifying that company policies are followed with respect to requisitions. The data are not continuous; there is one break. Outliers such as verifying the following of company procedures occur in the low end of level 5. The most frequently-occurring activity falls in the higher portion of level 3 and includes editing the content of marketing, public relations, and presentation materials. The mode represents 38 instances, or material-and-task combinations performed on the job.

Quantitative. The numerical print use of mid- to executive-level secretaries reflects work from level 1, for example, reading diaries and appointment books and extracting the pertinent information, to the top of level 4, for instance, tracking expenses on expense reports. There are four breaks in the data, with examples of outliers including filling out a travel form or petty cash voucher (level 3) and tracking expenses (level 4), as mentioned previously. The mode is in the higher portion of level 1 and represents 72 instances. An example of this level is putting meeting minutes and agenda into standard format. The mode is in the higher portion of level 1 and represents 72 instances. An example of this level is putting meeting minutes and agenda into standard format.

Figure 4: Mid- to Executive-Level Secretary Print Use Profile



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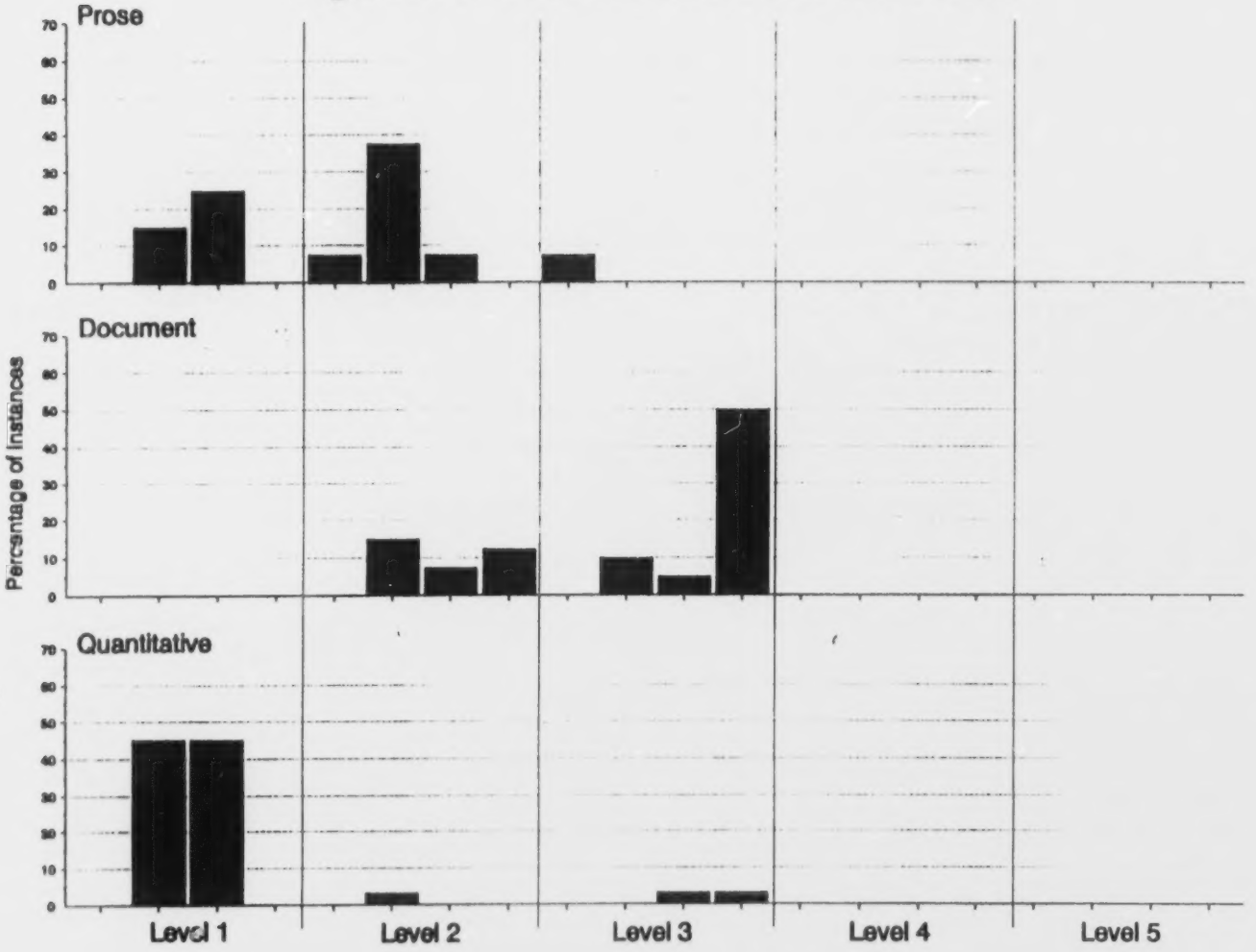
Nurse Assistant

Prose. As Figure 5 indicates, nurse assistants use prose that ranges from level 1 to the bottom of level 3. An example of the lower level is reading the patient's appointment schedule. The higher level is represented by reading a fire safety questionnaire. The nurse assistant data has two breaks in it, with the prominent outlier located at level 3. The mode, reflecting 15 cases, appears at level 2. The level is represented by monitoring and reviewing the patient's vital signs record.

Document. Nurse assistant document use ranges from obtaining the patient's or a relative's signature on the Patient's Bill of Rights (level 2) to recording the patient's activities on his or her turning record (the top of level 3). There is one break in the data but no prominent outliers. The mode, representing 20 instances, occurs at level 3.

Quantitative. The quantitative print use of nurse assistants is shown in Figure 5. The work activity ranges from level 1, for instance, reviewing the daily assignment sheets, to level 3, for example, calculating the shift and daily totals for each patient on the intake and output record sheets. The data has two breaks, with the outliers at level 3 (e.g., monitoring and recording the patient's vital signs, height, and weight and recording intake and output). The most frequent quantitative instance appears at level 1, reflecting 28 cases. An example of level 1 includes filling out vacation and leave request forms.

Figure 5: Nurse Assistant Print Use Profile



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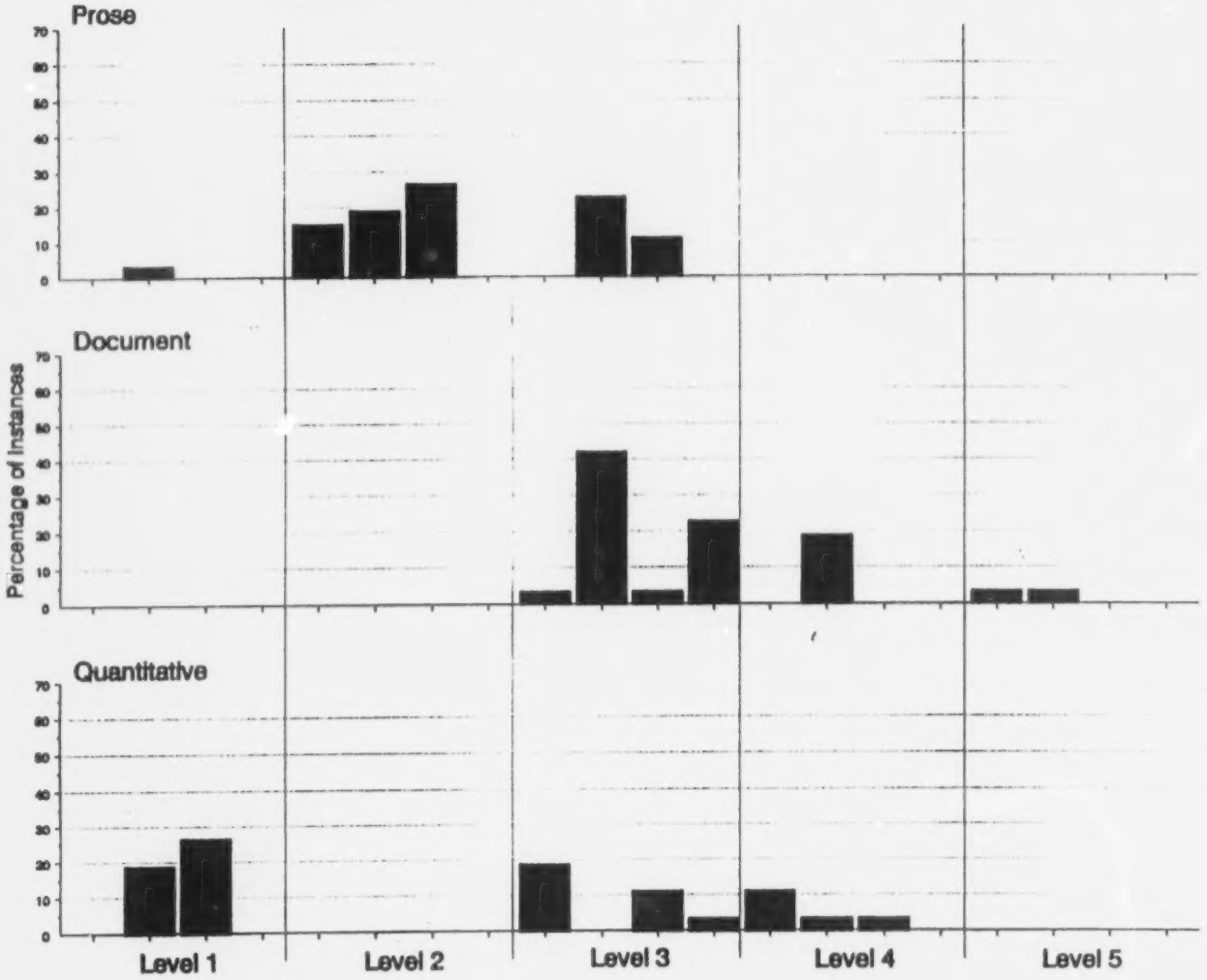
Quality Control

Prose. As indicated in Figure 6, the prose demands for the job grouping of quality control range from level 1 to level 3. An example of level 1 is reading a gauge; an instance of level 3 is reading and interpreting codes and sample data in an analysis chart. The data are not continuous, but have two breaks. The main outlier occurs in level one. The mode for quality control prose falls in level 2, for example, weighing a sample to be tested. The mode represents seven different instances.

Document. Quality control document use is shown in Figure 6. The data ranges from recording the results on a test report (the lower part of level 3) to studying the test report results to decide the correct amount of ingredients (the lower part of level 5). There are two breaks in the data, with the principle outliers in level 5. The mode, representing 11 cases, fall in level 3.

Quantitative. The quantitative print use of quality control is displayed in Figure 6. The work activity ranges from level 1 to level 4. An example of the lower end of the range includes weighing the amount of a sample, and an example of the higher end is averaging the standard amount of a substance and dividing by the factor for that week. There are two breaks in the range, with no main outliers, but a noteworthy gap in the data at level 2. The most frequent instance occurs in level 1 and is represented by the weighing of various samples. The mode reflects seven instances.

Figure 6: Quality Control Print Use Profile



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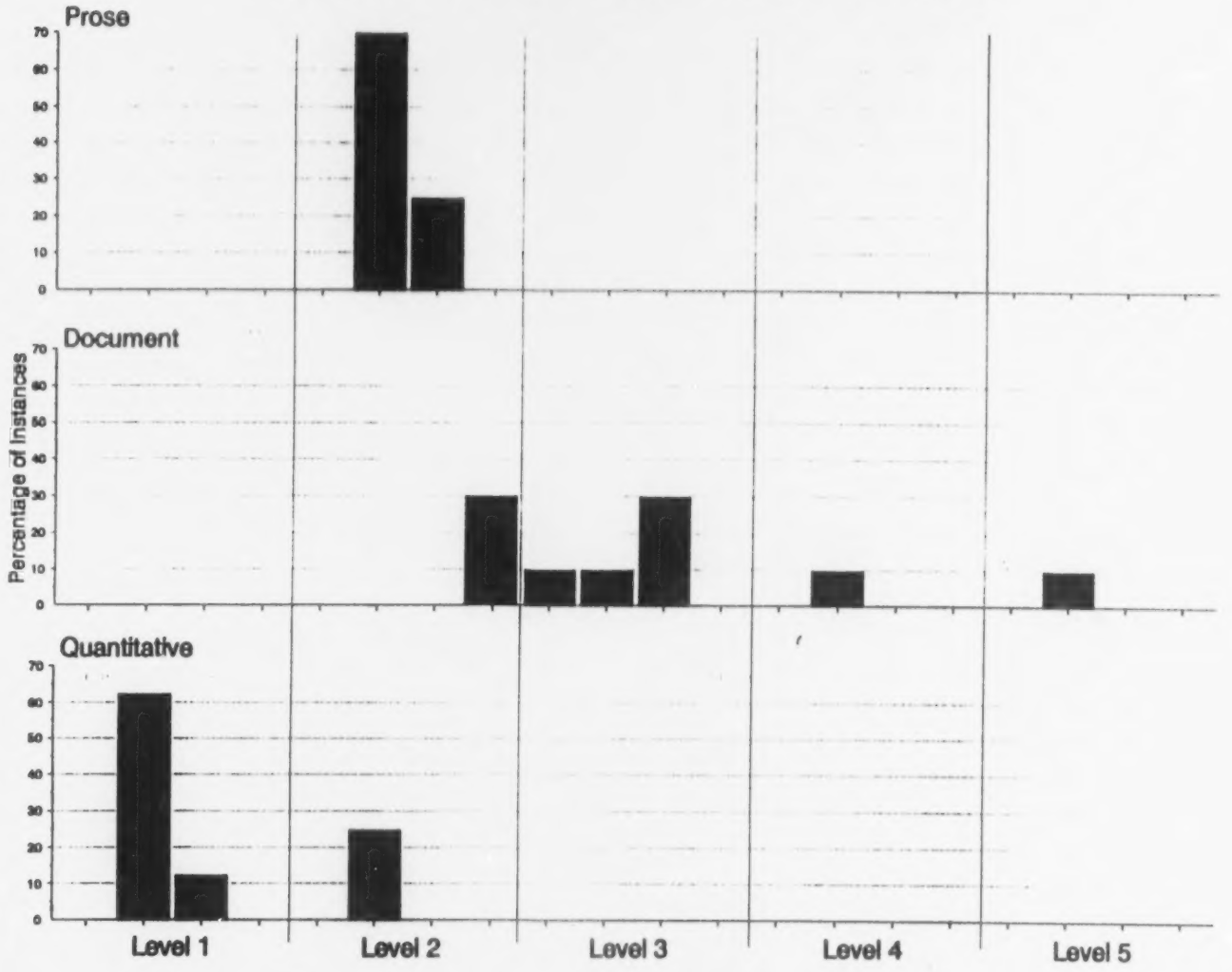
Sanitation

Prose. Prose print use in the sanitation job grouping is concentrated at level 2, ranging from identifying items for evaluation on the preoperational checklist to reading the information on the Material Safety Data Sheet (MSDS). The data is continuous (see Figure 7). The mode, reflecting six instances, occurs in the lower part of level 2.

Document. Document print use in sanitation varies from using the control panel to initiate the pumps and turn on the water and steam to troubleshooting problems with the product flow using the flow diagram. The range covers the higher portion of level 2 to the lower portion of level 5. The data has two breaks, with the outliers in levels 4 and 5. An example of level 5 was described above. An example of level 4 includes using the process instrumentation diagram to identify the flows and connections among the tanks, pipes and panels. The two most frequently occurring activities, each reflecting three cases, appear at levels 2 and 3. An example of the first is given above; a case of the latter includes locating in the chemical publications the information on safety, mixing, handling, and usage.

Quantitative. Quantitative print use in the sanitation job grouping, shown in Figure 7, varies from mid-level 1 to mid-level 2. Examples of work activities demonstrating this range include reading the circulation diagram to locate the milk lines and reading the information from the Material Safety Data Sheet (MSDS sheet) on the overview of the chemicals. The data is continuous and the mode, reflecting five cases, occurs at level 1, described above.

Figure 7: Sanitation Worker Print Use Profile



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IV. Discussion of the Findings

Prose, Document, and Quantitative Demands of Jobs

The analysis of the print-use profiles of six job groupings has added to our understanding of the PDQ literacy demands of actual jobs. The profiles for each job grouping are shown in Figures 2 through 7. The *prose* demands of the job groupings may span one level, as with sanitation, or up to five levels, as with entry-level secretary and mid- to executive-level secretary. The *document* print use of the various job groupings tend to span across at least two levels. *Quantitative* print use is focused on level one, with outliers existing in all job groupings except sanitation.

Outliers manifest themselves in most of the quantitative analyses and some of the document and prose analyses. When instruction is being developed for particular job groupings, the content could focus on the levels of the main body of the data. Supplemental instruction could then teach workers the specific job tasks that meet the needs reflected by the outliers. For example, entry-level secretary "outlier" or adjunct instruction for prose needs would center on level 5: e.g., processing (opening, prioritizing, sorting and answering) the mail; and compiling summary reports based on two or more sources. The main body of instruction would bring workers to prose level 4. In sanitation, adjunct instruction for document use would concentrate on level 5, for example, troubleshooting problems with product flow using the flow diagram, and level 4, for instance, using the process instrumentation diagram

to identify the flows and connections among the tanks, pipes, and panels. The bulk of the instruction for sanitation would bring participants to document level 3.

Adjunct instruction for the quantitative skills for food service workers would teach them how to track and calculate, for the food production order, the number of portions prepared, served, or left over; and conversion. These tasks represent the higher part of level 3 and the lower part of level 4. In this job grouping, since the main body of quantitative print use is in level 1, workers may not need a main body of instruction.

Adjunct instruction for the quantitative demands of the nurse assistant position would center on monitoring and recording the patient's vital signs, height and weight, and calculating the shift and daily totals for each patient on the intake and output record sheets. These tasks represent the higher portion of level 3. Again, in this job grouping, most nurse assistant quantitative print use is at level 1; a main body of instruction may not be needed.

Print-use profiles can provide information useful in developing cost-effective instruction for the prose, document and quantitative print use of various job groupings. It is important that the main body of instruction and the adjunct instruction be high in functional context. As early as 1984, Sticht and Mikulecky referred to functional context as the use in instruction of a setting meaningful to the persons taking the instruction. Many curriculum developers have stressed the incorporation in workplace basic skills training of materials actually used on the job (Norback, in press). Recent research (e.g., Mikulecky &

Lloyd, 1995) supports the thesis that learners will tend to apply skills learned in the classroom to the workplace if at least 20 to 30 percent of the instructional materials include workplace examples. So the use of contextual or workplace materials and tasks in the main body of instruction and the adjunct instruction is highly recommended.

Print-use profiles can also provide helpful guidelines relating to the experience expected for the job. For instance, it may be more effective to expect food service worker applicants to have level 1 quantitative skills and to instruct them specifically in conversion rather than attempt to bring them to level 4 in other quantitative skills.

In the 1992 National Adult Literacy Survey (NALS), more than 26,000 adults 16 and older were interviewed. Almost one-fourth (21 to 23 percent) demonstrated skills in level 1 of prose, document and quantitative proficiencies. Another one-fourth (25 to 28 percent) of the respondents demonstrated skills in level 2 on each of the literacy scales. An estimated one-third (28 to 36 percent) registered in level 3, and a final one-fifth (18 to 21 percent) fell into levels 4 and 5 (Kirsch, Jungeblut, Jenkins & Kolstad, 1993). Yet our data from the workplace indicates that the print-use levels of four of the six job groupings reflect use in levels 4 and 5. Within prose use, two of the six jobs range into level 4 or 5, and in document and quantitative use, four of the six jobs range into levels 4 or 5. The key difference may be the focus on job context in print-use profiles. It is possible that even though the NALS survey indicates limited levels of general adult literacy, workers may be more

proficient in their work contexts when working with materials and tasks recognizable to them. It is also possible that the survey numbers reflect that workers are more proficient in application mode (that is, applying or using these skills) than in assessment mode (that is, in being tested on these skills). This is one reason that performance assessment and simulation learning have received an added emphasis in recent years (Norback, in press).

Educational Implications

Implications for training on the job have been discussed. The results are equally applicable to education in schools.

Reading at work is different from reading at school. For example, Mikulecky has described differences in reading in school and work; reading at school is likely to focus on longer, less varied sources (Diehl & Mikulecky,1980, Mikulecky, 1982, Sticht & Mikulecky, 1984, Mikulecky, 1985, Rush, Moe & Storlie, 1986). Philippi has pointed out how reading to learn is different from reading to do (Philippi, 1988, 1991).

Teachers need to be knowledgeable about the world of work. They often are missing the constructs that would help them understand how literacy skills impact job performance. We need to consider how to provide that knowledge. For example, employers could periodically send to schools sets of information about skills required. Employers could also provide examples of materials and tasks that require various levels of prose, document, and quantitative literacy.

Analysis of the literacy demands of jobs can provide principles for bringing together the world of school and the world of work. Workplace tasks and materials can stimulate the learning of prose, document, and quantitative skills in school settings. There is increasing recognition of the need for expanded relationships between schools and employers. There is renewed interest in apprenticeships, job shadowing, and traditional programs of cooperative education, in which schools and employers share instructional responsibilities (Barton, 1996). In addition, there are precedents for employers providing instructional material to teachers (e.g., the New Standards Project[3]). On the basis of the analysis of both skills and demands, we offer some suggestions to make employer-school collaboration effective.

- The school-employer interaction needs to be regular and systematic.
- There needs to be rewards on both sides.
- Schools and employers need to engage in collaborative problem-solving to identify the pedagogical implications of workplace tasks and materials, and to design effective teaching activities using those materials.
- Both teachers and employers require instruction on how to turn workplace materials into effective teaching materials.

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[3] Personal communication with New Standards teachers who had collected materials from the workplace, July 1994.

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APPENDIX I

PRINT-USE PROFILE PROCEDURE

Note: Each judgment takes into account both the task performed by the worker and the particular material used in the task. For example, for mid-to executive-level secretaries, proofreading text in form letters and memos has a lower prose demand than proofreading text in reports, proposals, newsletters, and magazines.

1) Start with a description of the most important materials read and used on the job, and the tasks performed by the workers with the materials.

2) Select the tasks that are most telling of the PDQ level and that are not redundant. Use these guidelines:

   a) when possible, combine tasks within a material

   b) when possible, find one task whose PDQ implications subsumes several others, for example, "send to other parties" is subsumed under "write down and distribute messages."

   c) when the tasks for one material have similar question/directives (e.g., locate, generate--Kirsch, Jungeblut, Jenkins & Kolstad, 1993), they can be combined, for example, entry level secretary: send messages/distribute to appropriate parties; process telephone messages.

   d) computer tasks, telefaxing, typing and word processing are considered not to fall under PDQ.

3) Read the general description for each PDQ level and decide which level the task and material match. E.g., "Prose level 4--These tasks require readers to perform multiple-feature matches and to integrate or synthesize information from complex or lengthy passages. More complex inferences are needed to perform successfully. Conditional information is frequently present in tasks at this level and must be taken into consideration by the reader." (Kirsch, Jungeblut, & Campbell, 1991, p. 11)

4) Read the exemplars for the PDQ levels and decide which exemplar the workplace task and material match. For example, see Table 1, prose, level 4: "Explain differences between two types of employee benefits."

5) Read the Job Literacy notes on PDQ levels in Table 2 and decide which portion of which level the workplace task and material match. Record notes on the reasons for the decision.

6) Note which other workplace tasks and materials fall into that job literacy area or group and compare them: are they roughly equal in difficulty?

7) If the workplace task and material match more than one area in a level (e.g., if the material contains a simple list and a combined list), match them to the harder of the two. Assume that the easier is subsumed.

8) If task requirements are unclear due to the limit of information given, pick a reasonable estimate. If the information is so limited as to be unclear, do not include the task and material (for instance, in Sanitation, the task for Chemical Publications of: "identify which chemical to use for the job").

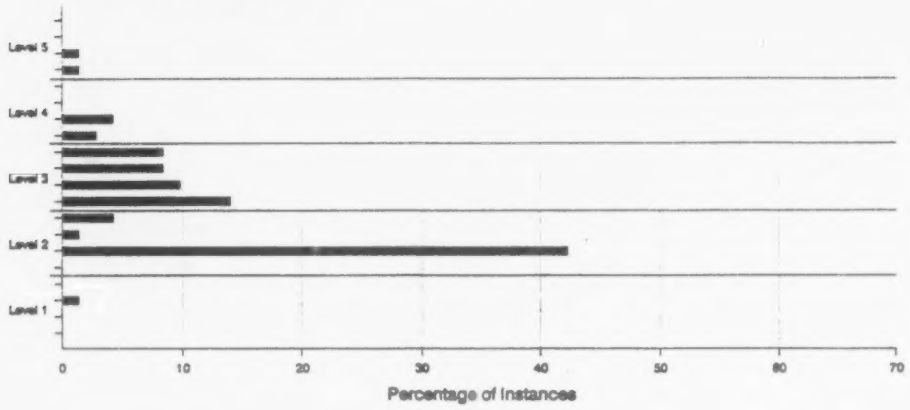
9) Check the judgments a second time.

10) Have another analyst independently review the judgments for agreement. Discuss any disagreements and add guidelines to this list as necessary.

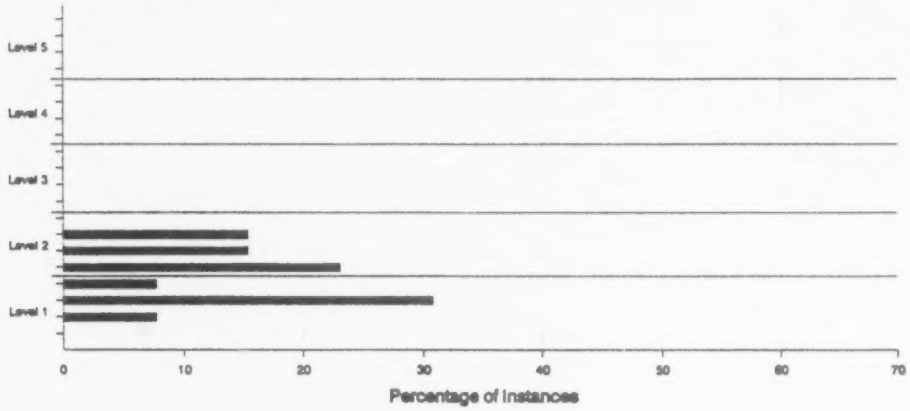
Appendix 2: Prose Print Use Profiles

Prose Print Use Profiles of Six Job Groupings

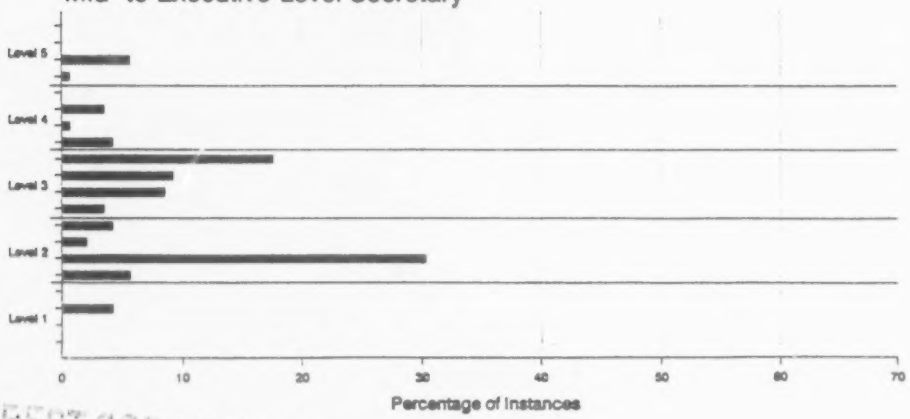
Entry-Level Secretary



Food Service Worker



Mid- to Executive-Level Secretary



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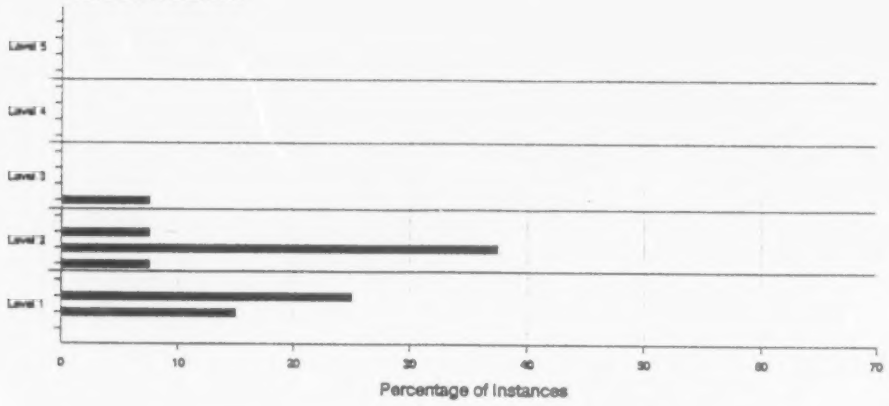
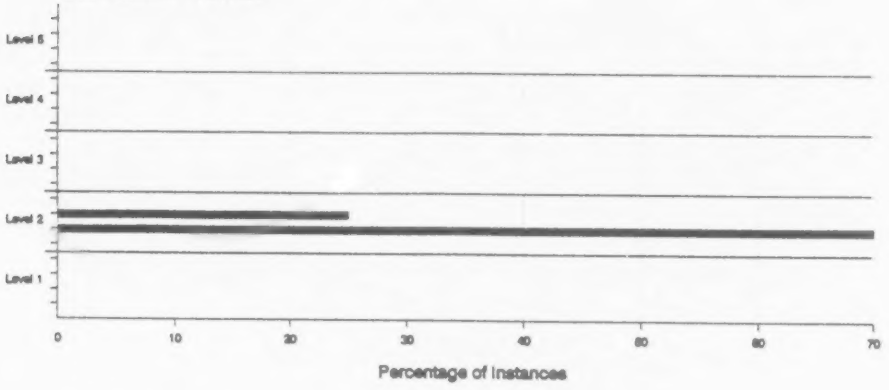
Prose Print Use Profiles (continued)

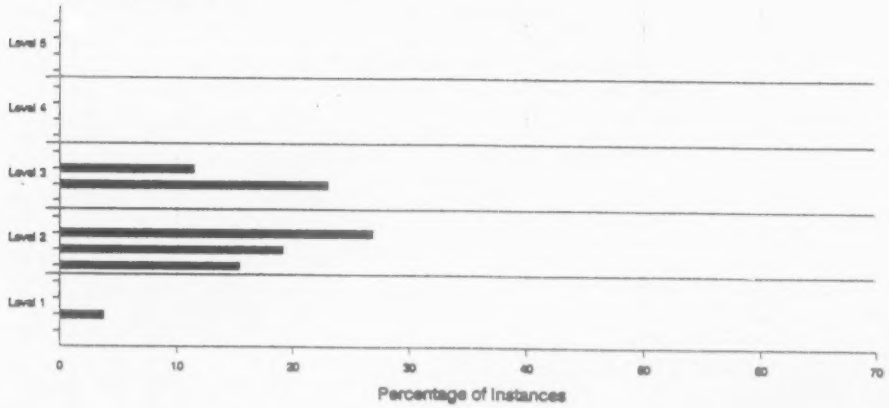
Nurse Assistant



Sanitation Worker



Quality Control



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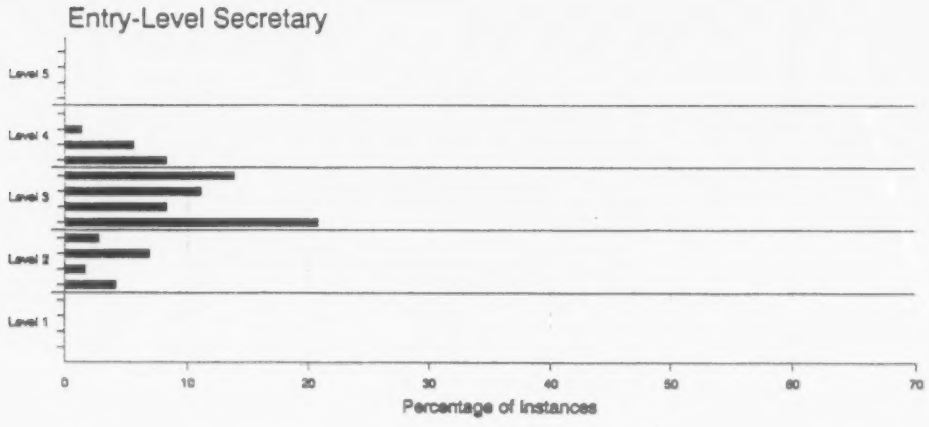
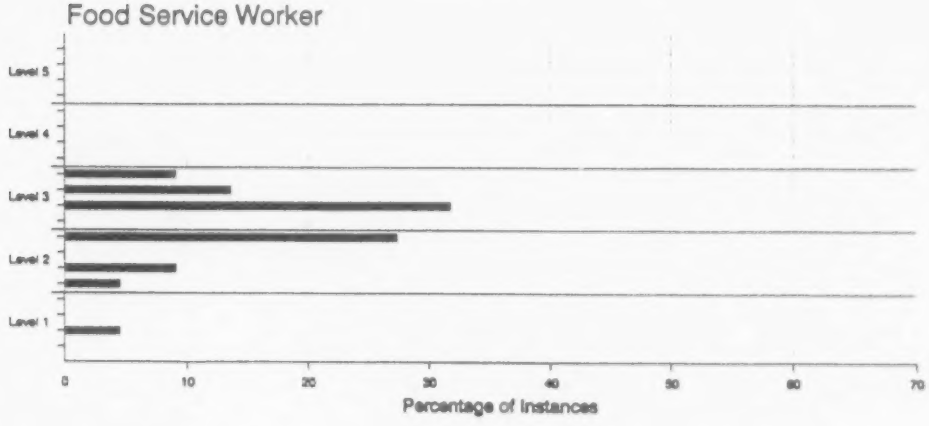
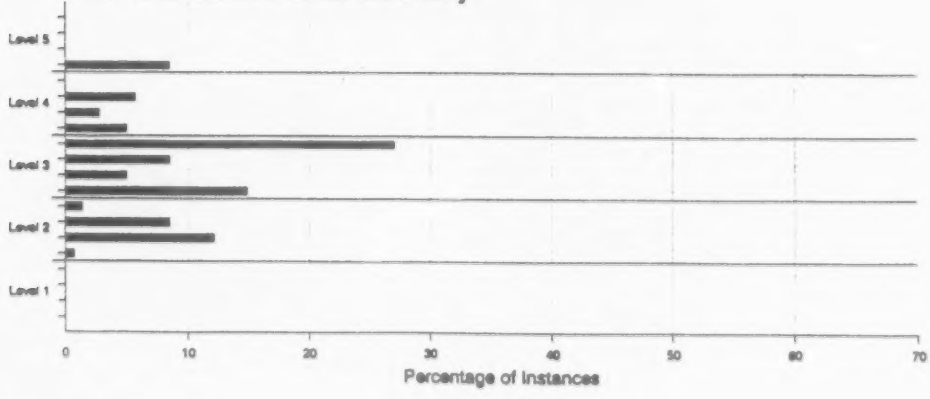
Appendix 3: Document Print Use Profiles

Document Print Use Profiles of Six Job Groupings







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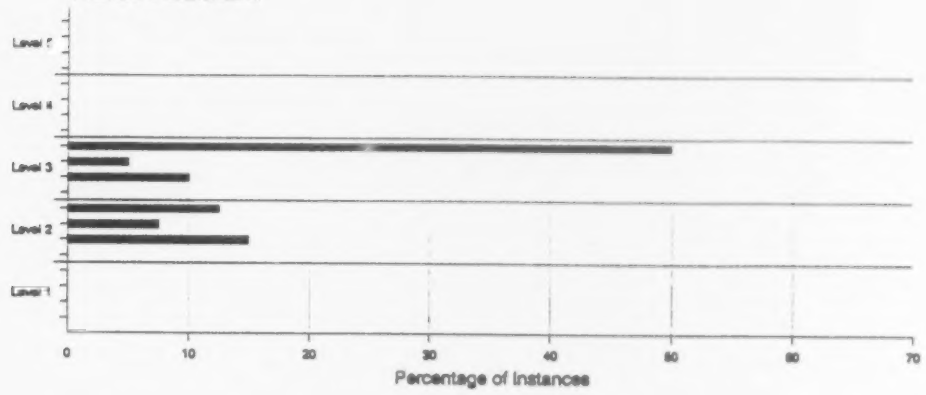
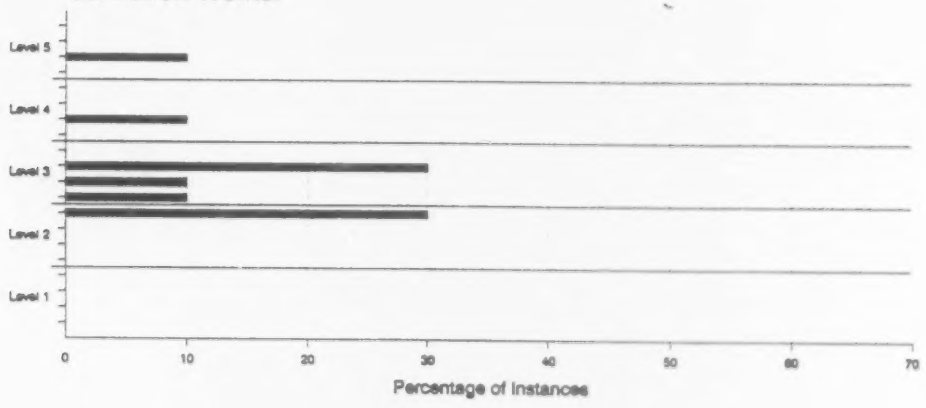
Document Print Use Profiles (continued)

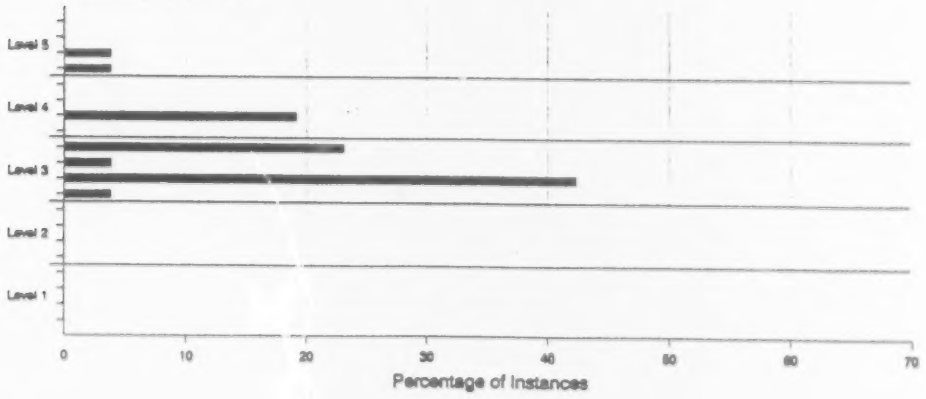
Nurse Assistant



Sanitation Worker



Quality Control



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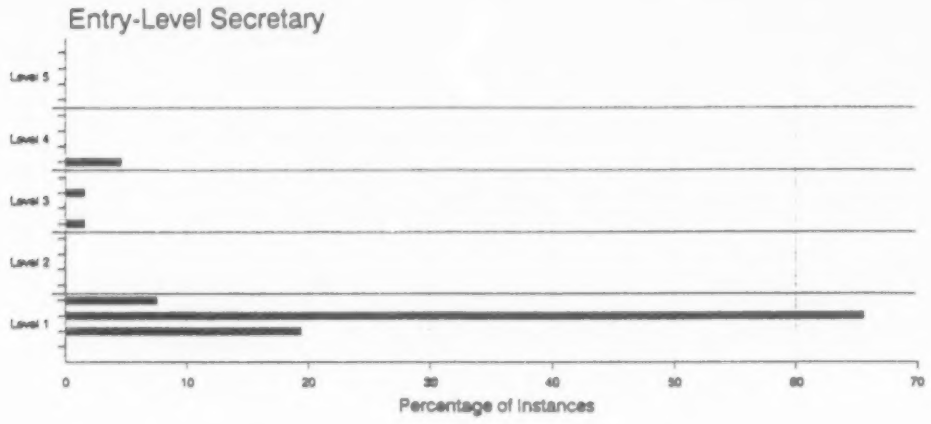
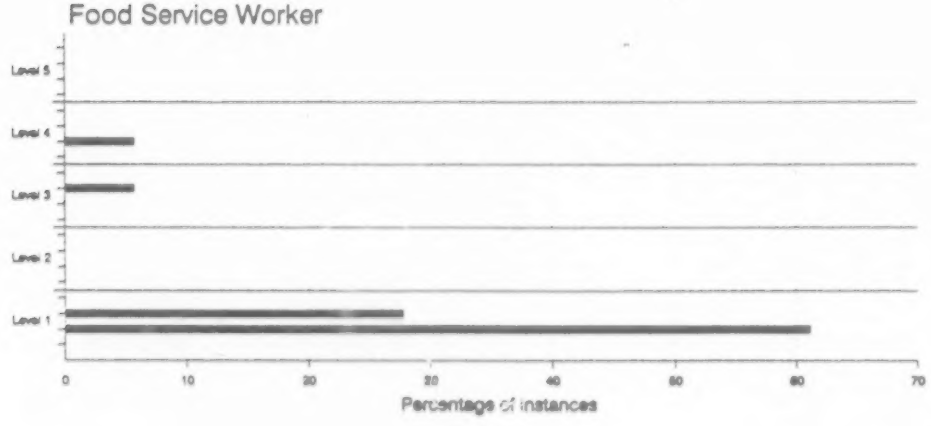
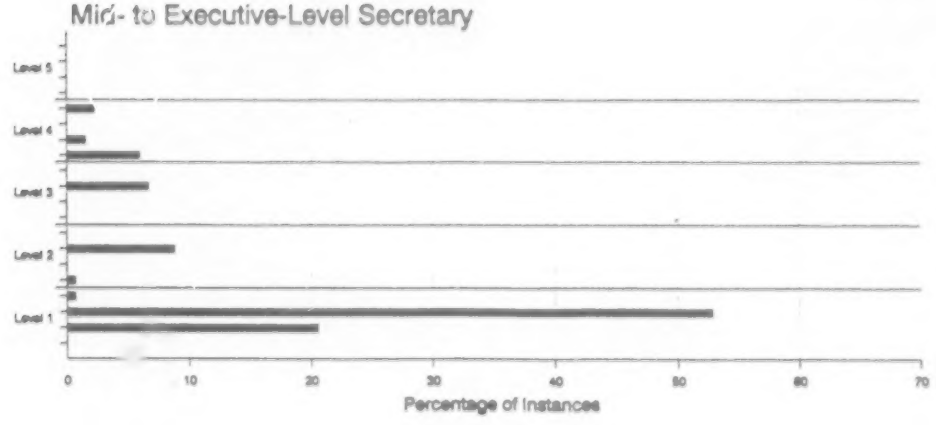
Appendix 4: Quantitative Print Use Profiles

Quantitative Print Use Profiles of Six Job Groupings







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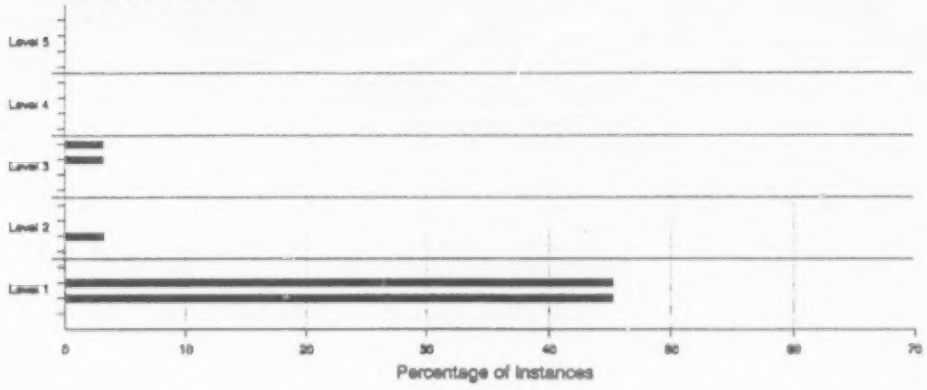
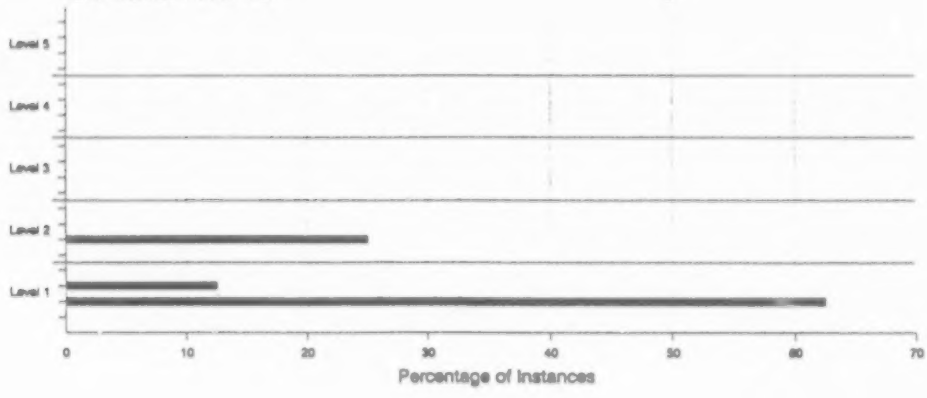
Quantitative Print Use Profiles (continued)

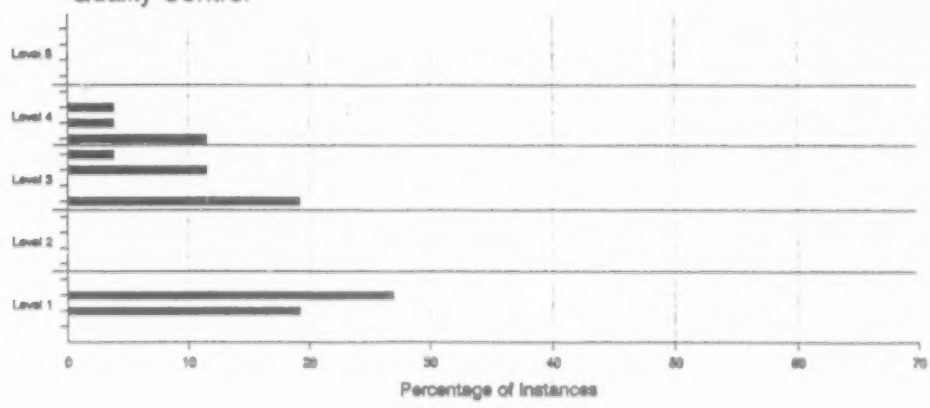
Nurse Assistant



Sanitation Worker



Quality Control



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LITERACY LEVELS FOR 90 OCCUPATIONS

by Paul E. Barton

For different occupations, how proficient do you have to be in dealing with instructions, information, and problems delivered in print form? Short of the use of job analysis techniques--studying each specific occupation--there is no way to establish this with certainty. In this volume Judith Norback and Garlie Forehand translate job literacy analyses done for six occupations into the levels of print use delineated in the National Adult Literacy Study. This approach to prose, document, and quantitative requirements of a specific job is surer than any other.

Another approach, which provides much less certainty, but is more readily accomplished, is to assess the proficiencies in dealing with prose, document, and quantitative materials of people who are actually working in specific occupations. This provides certainty in knowing the level of proficiency for people actually employed in specific occupations. However, they may be more or less literate in the use of these materials than they need to be, from the standpoint of actual job requirements. Also, the broader the occupational definition used, the wider the range of both actual literacy requirements, and the wider the range of literacy proficiencies of people working in those occupations.

The 1992 National Adult Literacy Study (NALS), carried out by Educational Testing Service under contract with the National Center for Education Statistics, measured the literacy of all adults. It also obtained information on labor force status and occupation. So we know the literacy proficiencies of employed people, by their occupation.

NALS indicates the literacy proficiencies of people employed in a particular occupation, to the extent that the size of the sample permits. We obtained data (unpublished) for about 90 specific occupations, in which there were 45 or more people.* What we show in the pages that follow are the *average* proficiencies for each of these 90 occupations. But because these are samples, we only know the band of scale scores that contains the true average, if all people in that occupation had been assessed. The real average, then, is within this band.

These bands are displayed in Figure 1 for prose proficiency. For example, there were 166 laborers in the sample and the average proficiency is somewhere between 230 and 262. The band represents the measured average (plus or minus two standard errors). The averages and the standard errors can be found in table 1.0. The standard errors, and therefore the width of the bands, vary with the size of the sample and the degree of variation in scores for each occupation. Figure 1 shows this band and the level of literacy in which it is located.

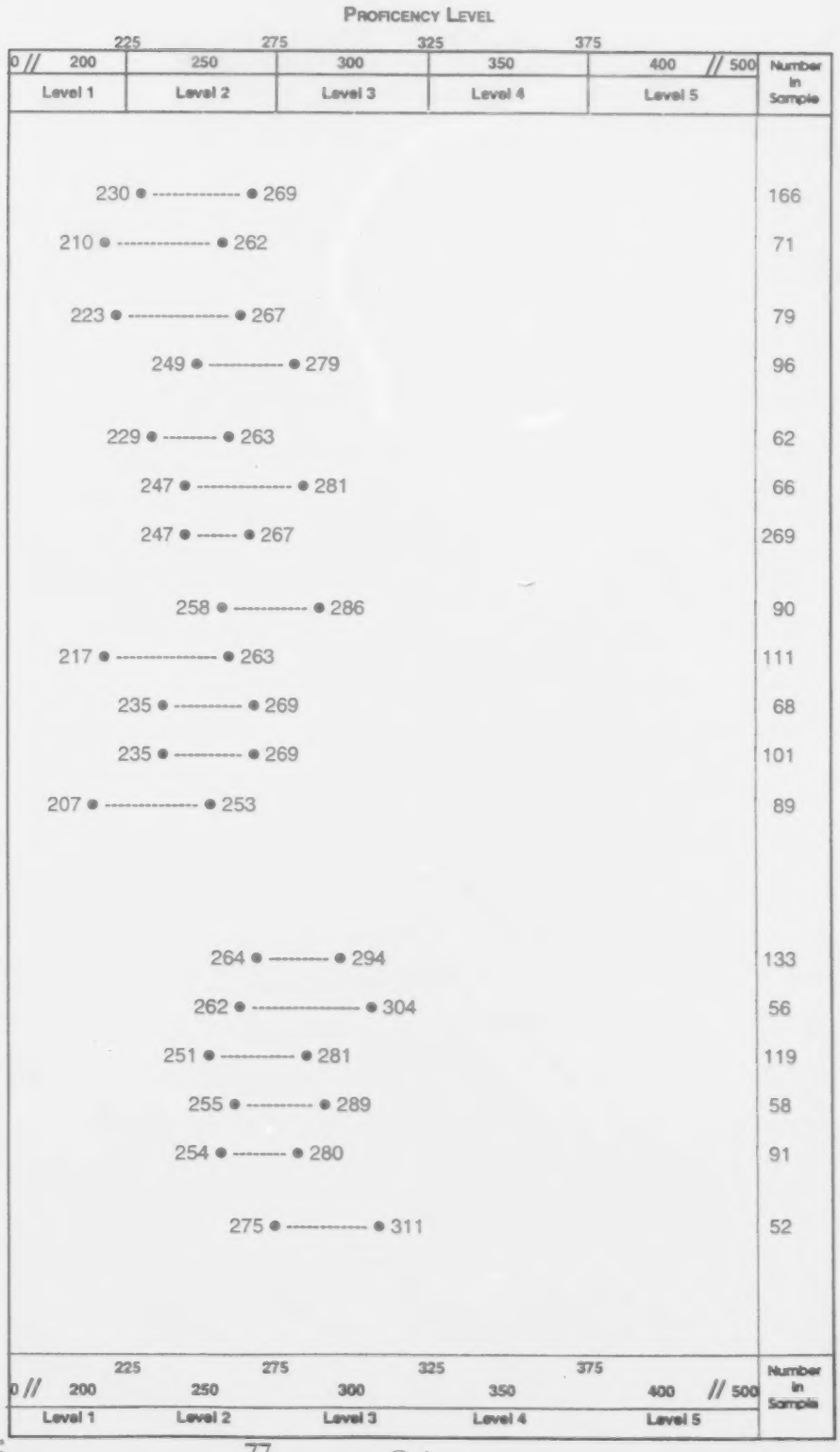
We will not here describe what these levels mean. They are described in *Becoming Literate About Literacy,* reproduced in this workbook.

The bands for prose proficiency are all provided in Figure 1. From tables 2 and 3, the bands for document and quantitative proficiency can be quickly calculated, using the standard error: double the standard error, add this number to the average, and subtract it from the average. The chances are 95 out of a 100 that the true average will be within this band.

* There were a few more than 90. They were not used either because of high standard errors or because the titles were not descriptive enough.

The assessment used for 1992 study is available to use with individuals. Information about its availability can be obtained by writing or calling.

FIGURE 1: AVERAGE (MEAN) PROSE* PROFICIENCY SCORES (EMPLOYED ADULTS, 1992)


PROFICIENCY LEVEL
0 // 200
225
250
275
300
325
350
375
400
// 500
Level 1
Level 2
Level 3
Level 4
Level 5
Number in Sample
OPERATORS, FABRICATORS AND LABORERS
Laborers, except construction (889) 230 ● ● 269 166
Hand Packers and Packagers (888) 210 ● ● 262 71
Freight, Stock and Materials Handlers (883) 223 ● ● 267 79
Stock Handlers & Baggers (877) 249 ● ● 279 96
Industrial Truck and Tractor Equipment Operators (856) 229 ● ● 263 62
Bus Drivers (808) 247 ● ● 281 66
Truck Drivers (804) 247 ● ● 267 269
Production Inspectors, Checkers and Examiners (796) 258 ● ● 286 90
Assemblers (785) 217 ● ● 263 111
Welders and Cutters (783) 235 ● ● 269 68
Miscellaneous Machine Operators (777) 235 ● ● 269 101
Textile Sewing Machine Operators (744) 207 ● ● 253 89
PRECISION PRODUCTION, CRAFT, AND REPAIR OPERATIONS
Supervisors, Precision Metal Working (628) 264 ● ● 294 133
Electricians (575) 262 ● ● 304 56
Carpenters (567) 251 ● ● 281 119
Construction Supervisors, N.E.C. (558) 255 ● ● 289 58
Automobile Mechanics (505) 254 ● ● 280 91
Supervisors, Mechanics, and Repairers (503) 275 ● ● 311 52

*The chances are 95 out of 100 that the mean is within the band indicated on the chart.

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Figure 1 (cont.)

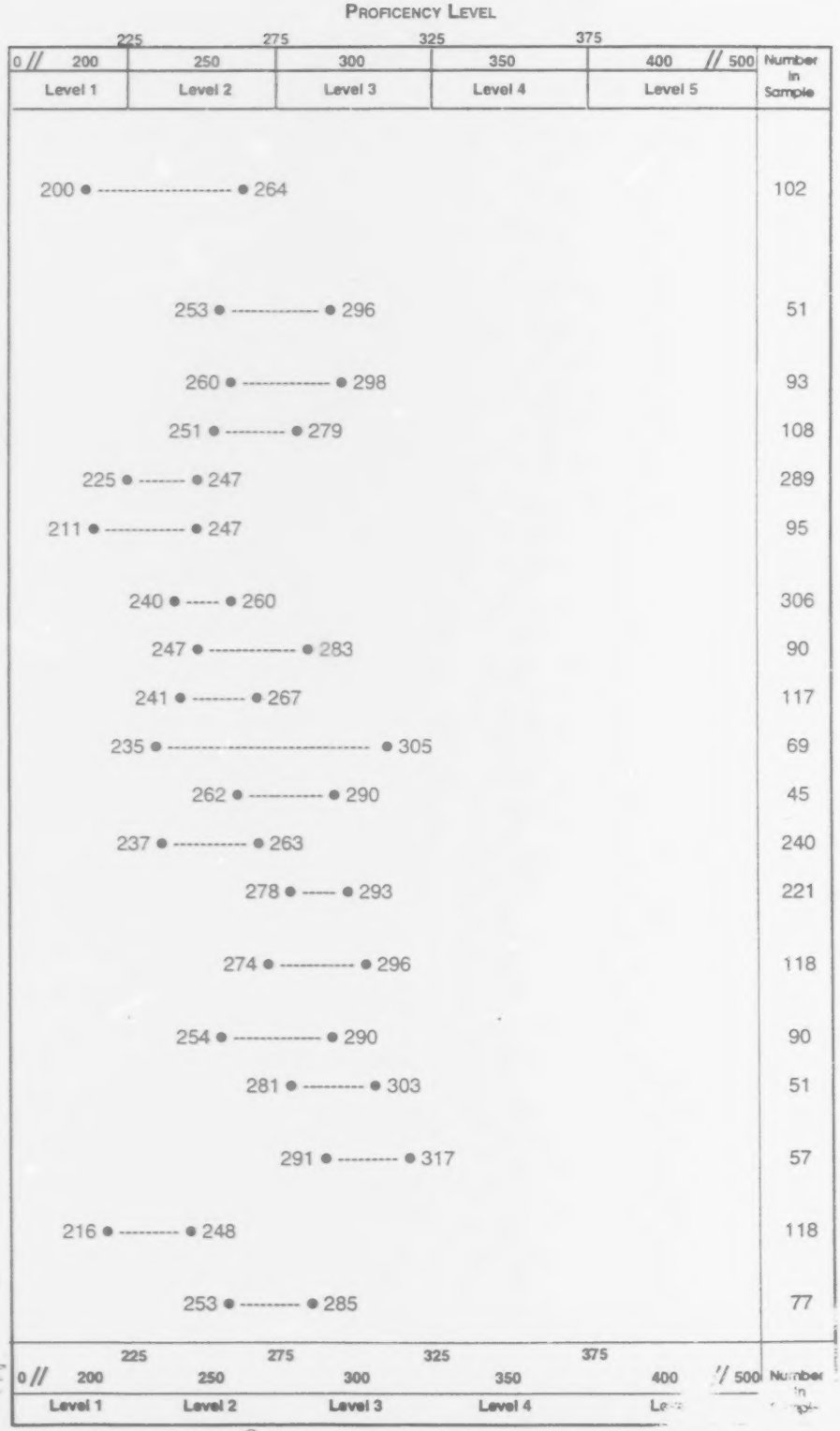
PROFICENCY LEVEL
0 // 200 225 250 275 300 325 350 375 400 // 500
Level 1
Level 2
Level 3
Level 4
Level 5
Number in Sample
FARMING, FORESTRY AND FISHING
Groundskeepers and Gardeners, except Farm (486) 200 ● ---------- ● 264 102
SERVICE OCCUPATIONS
Child Care Workers, N.E.C. (468) 253 ● ---------- ● 296 51
Family Child Care Providers, N.E.C. (466) 260 ● ---------- ● 298 93
Hairdressers and Cosmotologists (458) 251 ● --------- ● 279 108
Janitors and Cleaners (453) 225 ● ------- ● 247 289
Maids and Housemen (449) 211 ● ---------- ● 247 95
Nursing Aides, Orderlies, and Attendents (447) 240 ● ----- ● 260 306
Health Aides, except nursing (446) 247 ● ---------- ● 283 90
Miscellaneous Food Preparation (444) 241 ● -------- ● 267 117
Kitchen Workers, Food Preparation (439) 235 ● ---------- ● 305 69
Food Counter, Fountain, related (438) 262 ● ---------- ● 290 45
Cooks (436) 237 ● ---------- ● 263 240
Waiters and Waitresses (435) 278 ● ----- ● 293 221
Supervisors, food Preparation and Service (433) 274 ● ---------- ● 296 118
Guards and Police except public service (426) 254 ● ---------- ● 290 90
Correctional Institution Officers (424) 281 ● --------- ● 303 51
Police and Detectives, Public Service (418) 291 ● --------- ● 317 57
Private Household Cleaners and Servants (407) 216 ● --------- ● 248 118
Child Care Workers, Private Household (406) 253 ● --------- ● 285 77

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Figure 1 (cont.)

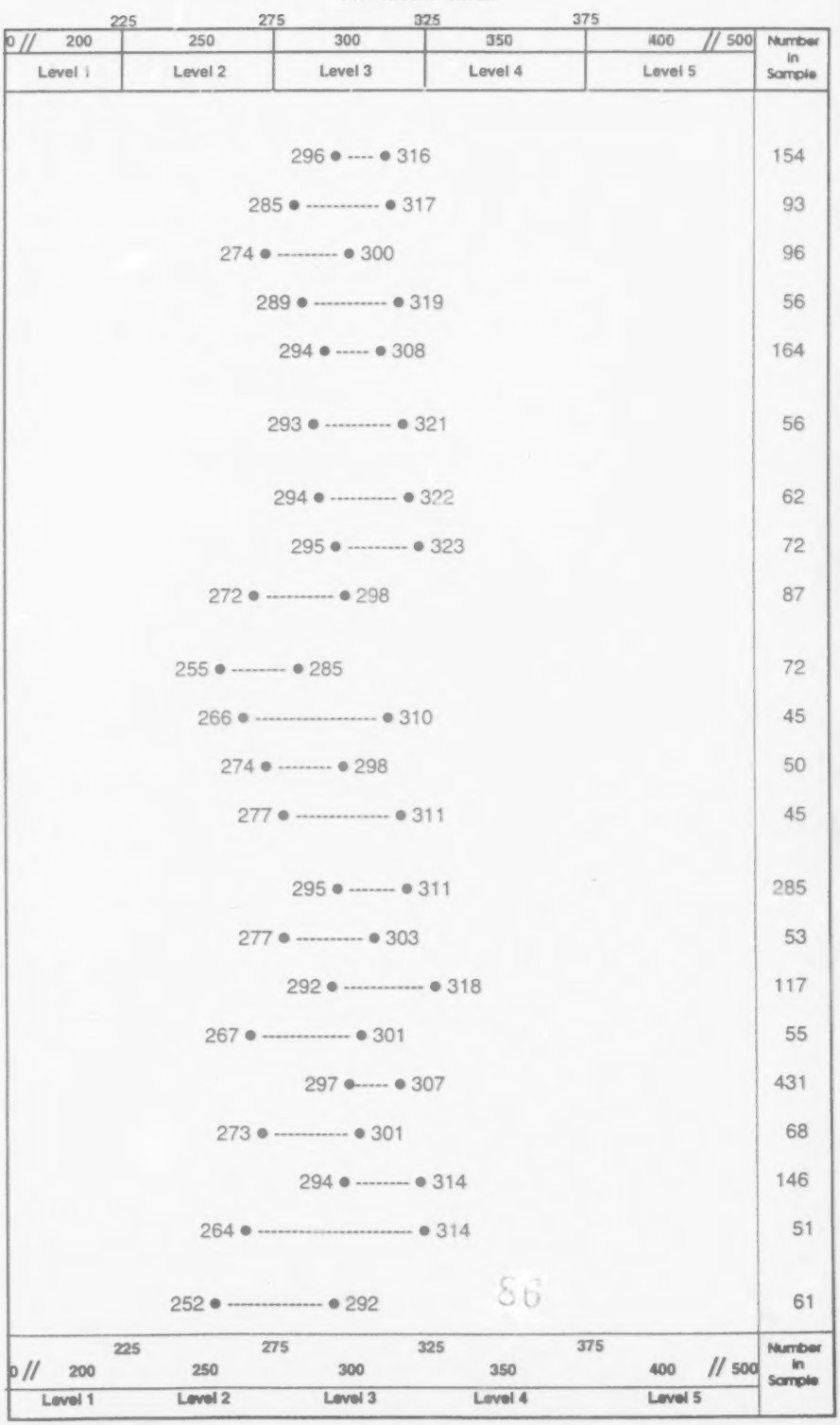
PROFICENCY LEVEL
225
275
325
375
0 // 200
250
300
350
400 // 500
Level 1
Level 2
Level 3
Level 4
Level 5
Number in Sample
TECHNICAL, SALES, AND ADMINISTRATIVE SUPPORT
Administrative Support, N.E.C.(389) 296 ● ---- ● 316 154
Teachers Aides (387) 285 ● ---------- ● 317 93
Data-Entry Keyers (385) 274 ● --------- ● 300 96
Bank Tellers (383) 289 ● ---------- ● 319 56
General Office Clerks (379) 294 ● ----- ● 308 164
Investigators and Adjusters except insurance) (376) 293 ● ---------- ● 321 56
Insurance Adjusters, examiners investigaors (375) 294 ● ---------- ● 322 62
Expediters (373) 295 ● --------- ● 323 72
Stock and Inventory Clerks (365) 272 ● ---------- ● 298 87
Traffic, Shipping, and Receiving Clerks (364) 255 ● -------- ● 285 72
Mail Carriers, Postal Service (355) 266 ● ---------- ● 310 45
Postal Clerks, excluding mail carriers (354) 274 ● -------- ● 298 50
Payroll and Time Keeping Clerks (338) 277 ● ---------- ● 311 45
Bookkeepers, Accounting, and Auditing Clerks (337) 295 ● ------- ● 311 285
Records Clerks (336) 277 ● ---------- ● 303 53
Receptionists (319) 292 ● ---------- ● 318 117
Stenographers (315) 267 ● ---------- ● 301 55
Secretaries (313) 297 ●----- ● 307 431
Computer Operators (308) 273 ● ---------- ● 301 68
General Office Supervisors (303) 294 ● -------- ● 314 146
Sales Support Occupations, N.E.C. (285) 264 ● ---------- ● 314 51
Street and Door to Door Sales Persons (277) 252 ● ---------- ● 292 61
86
0 // 200
225
250
275
300
325
350
375
400 // 500
Level 1
Level 2
Level 3
Level 4
Level 5
Number in Sample

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Figure 1 (cont.)

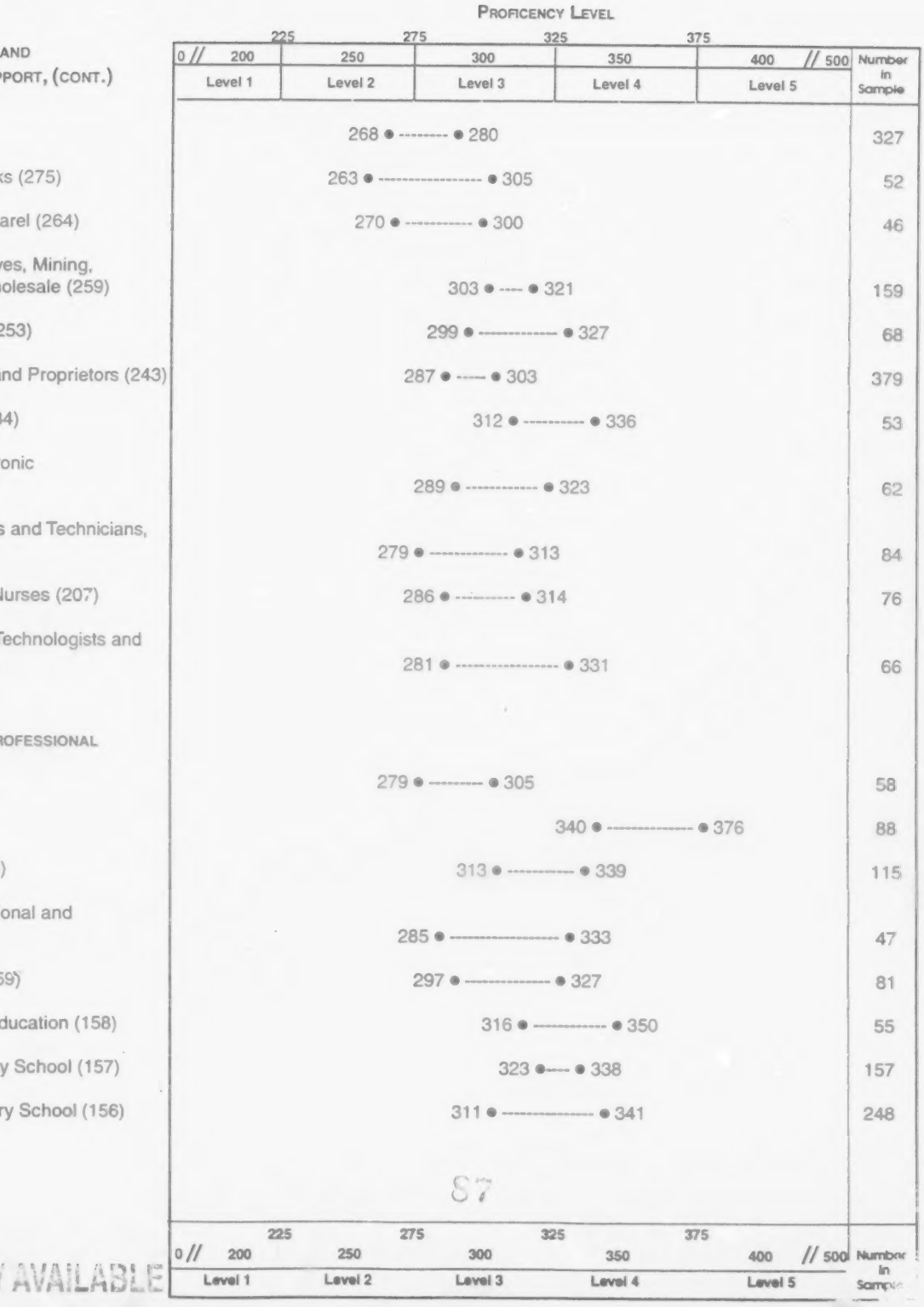

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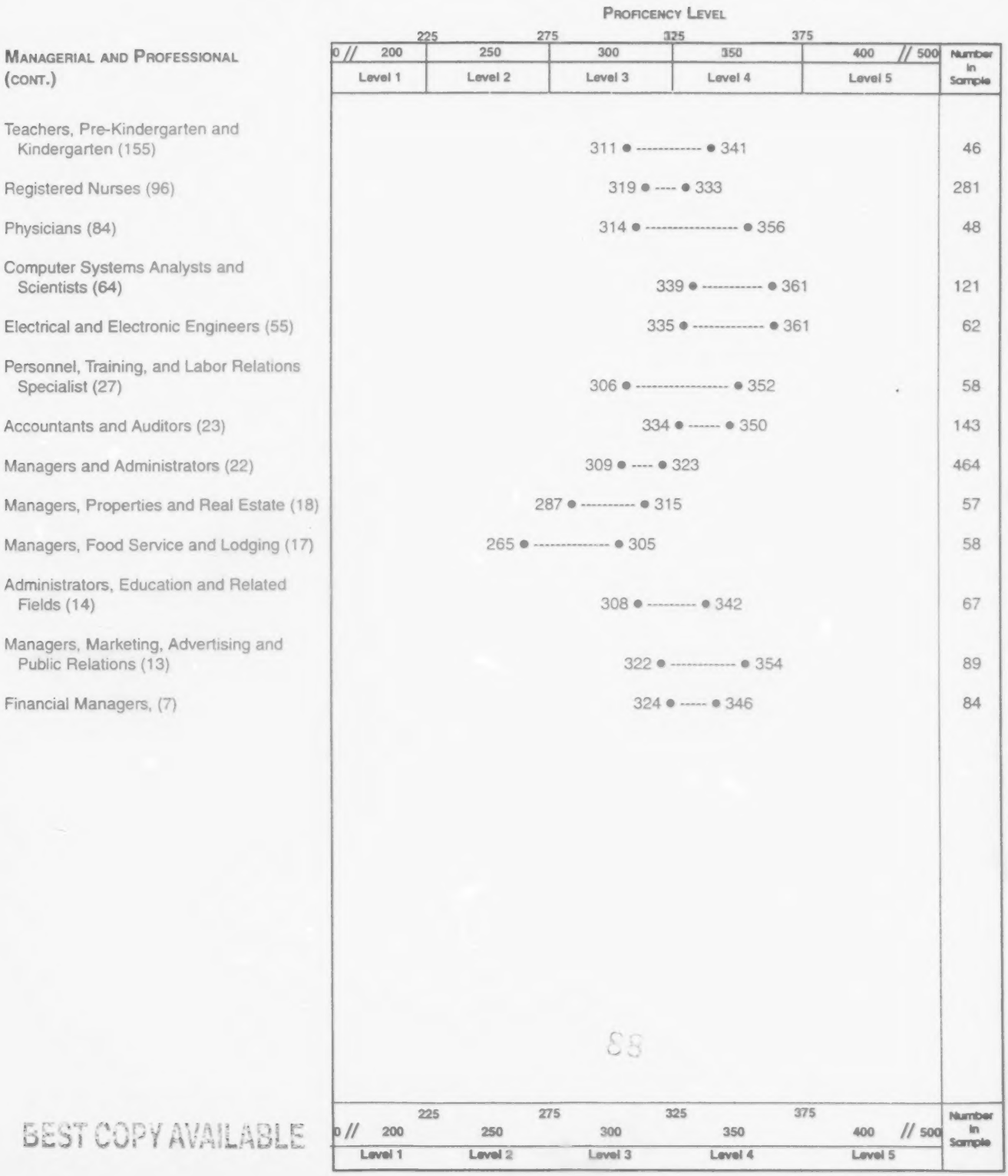
Figure 1 (cont.)



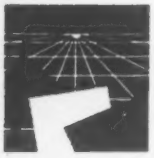


TABLE 1.0

Proficiency Scores by Occupation Codes

OCCUPATION CODES			SCALES		
			Prose	Document	Quantitative
	n	WGT N (/1,000)	PROF (SE)	PROF (SE)	PROF (SE)
Occupation code 889	166	1,437	246 (8.0)	244 (7.1)	243 (7.9)
Occupation code 888	71	557	236 (13.0)	231 (13.1)	238 (12.3)
Occupation code 883	79	645	245 (10.9)	243 (11.3)	243 (10.8)
Occupation code 877	96	740	264 (7.3)	261 (7.8)	267 (10.0)
Occupation code 856	62	538	246 (8.3)	243 (7.3)	247 (10.0)
Occupation code 808	66	420	264 (8.5)	261 (8.5)	267 (8.3)
Occupation code 804	269	2,221	257 (4.9)	260 (4.7)	268 (4.8)
Occupation code 796	90	669	272 (8.2)	265 (8.0)	273 (7.4)
Occupation code 785	111	748	240 (11.6)	240 (11.2)	245 (12.7)
Occupation code 783	88	448	252 (8.6)	251 (8.7)	257 (10.6)
Occupation code 779	47	284	244 (10.1)!	238 (10.1)!	244 (11.6)!
Occupation code 777	101	770	252 (8.3)	247 (9.1)	256 (9.3)
Occupation code 744	89	695	230 (11.6)	223 (9.7)	225 (9.1)
Occupation code 628	133	1,006	279 (7.5)	279 (6.4)	285 (7.0)
Occupation code 579	54	460	253 (10.8)!	247 (12.5)!	255 (9.7)!
Occupation code 575	56	370	283 (10.4)	281 (12.2)	300 (9.4)
Occupation code 567	119	1,069	266 (7.3)	262 (8.6)	275 (7.4)
Occupation code 558	58	466	272 (8.5)	275 (9.6)	287 (9.0)
Occupation code 505	91	704	267 (6.6)	266 (7.1)	273 (6.1)
Occupation code 503	52	464	293 (8.9)	292 (7.2)	301 (8.3)
Occupation code 486	102	915	232 (16.1)	233 (12.1)	234 (16.6)
Occupation code 479	88	755	227 (15.4)!	227 (16.8)!	230 (18.0)!
Occupation code 473	105	729	259 (8.2)!	258 (9.9)!	286 (10.0)!
Occupation code 468	51	332	273 (11.4)	260 (12.3)	257 (12.2)
Occupation code 466	93	724	279 (9.7)	267 (9.5)	271 (8.4)
Occupation code 458	108	587	265 (7.0)	259 (6.8)	268 (7.7)
Occupation code 453	289	2,139	236 (5.6)	231 (5.7)	231 (6.0)
Occupation code 449	95	571	229 (8.8)	229 (8.5)	225 (8.3)
Occupation code 447	306	1,788	250 (4.8)	246 (6.2)	247 (6.1)
Occupation code 446	90	541	265 (7.9)	261 (8.1)	259 (8.1)
Occupation code 444	117	826	254 (6.7)	250 (6.4)	245 (6.5)

n = sample size; WGT N = population size estimate / 1,000 (the sample sizes for subpopulations may not add up to the total sample sizes, due to missing data); PROF = average proficiency estimate; (SE) = standard error of the estimate (the true population value can be said to be within 2 standard errors of the sample estimate with 95% certainty).

! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this statistic.

Source: U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992.

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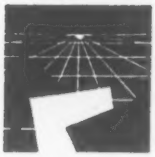

Proficiency Scores by Occupation Codes

OCCUPATION CODES			SCALES		
			Prose	Document	Quantitative
	n	WGT N (/1,000)	PROF (SE)	PROF (SE)	PROF (SE)
Occupation code 443	47	419	255 (13.6)!	254 (13.0)!	247 (11.8)!
Occupation code 439	69	646	270 (17.4)	264 (12.0)	267 (10.2)
Occupation code 438	45	429	276 (6.9)	277 (9.2)	273 (6.5)
Occupation code 436	240	1,824	250 (6.3)	249 (5.9)	245 (5.4)
Occupation code 435	221	1,790	285 (3.9)	284 (4.6)	282 (5.2)
Occupation code 434	47	345	297 (10.6)!	294 (10.6)!	297 (9.1)!
Occupation code 433	118	844	285 (5.6)	283 (6.3)	281 (6.2)
Occupation code 426	90	725	272 (8.8)	268 (7.7)	274 (6.4)
Occupation code 424	51	375	292 (5.6)	292 (6.7)	296 (7.0)
Occupation code 418	57	389	304 (6.3)	303 (6.9)	310 (7.8)
Occupation code 407	118	688	232 (7.8)	222 (9.1)	227 (8.5)
Occupation code 406	77	554	269 (7.9)	263 (11.3)	265 (11.6)
Occupation code 389	154	947	306 (4.8)	299 (5.4)	299 (5.1)
Occupation code 387	93	565	301 (8.0)	293 (6.5)	294 (7.6)
Occupation code 385	96	490	287 (6.6)	285 (5.4)	289 (6.8)
Occupation code 383	56	350	304 (7.3)	298 (7.5)	301 (7.9)
Occupation code 379	164	938	301 (3.5)	289 (6.5)	292 (5.5)
Occupation code 376	56	396	307 (7.1)	305 (7.5)	311 (7.5)
Occupation code 375	62	420	308 (7.0)	305 (7.1)	312 (6.3)
Occupation code 373	72	404	309 (6.9)	304 (7.4)	305 (9.6)
Occupation code 365	87	717	285 (6.4)	281 (6.2)	285 (6.6)
Occupation code 364	72	657	270 (7.5)	267 (8.5)	276 (6.7)
Occupation code 355	45	312	288 (11.0)	286 (9.9)	296 (10.7)
Occupation code 354	50	328	286 (6.0)	279 (6.6)	286 (6.8)
Occupation code 338	45	257	294 (8.5)	290 (10.8)	298 (9.3)
Occupation code 337	285	1,941	303 (4.1)	299 (3.9)	304 (4.6)
Occupation code 336	53	383	290 (6.6)	287 (5.2)	287 (6.6)
Occupation code 319	117	903	305 (6.7)	293 (5.6)	293 (5.3)
Occupation code 315	55	331	284 (8.4)	284 (10.2)	285 (10.8)
Occupation code 313	431	2,662	302 (2.6)	295 (3.0)	299 (3.3)

n = sample size; WGT N = population size estimate / 1,000 (the sample sizes for subpopulations may not add up to the total sample sizes, due to missing data); PROF = average proficiency estimate; (SE) = standard error of the estimate (the true population value can be said to be within 2 standard errors of the sample estimate with 95% certainty).

! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this statistic.

Source: U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992.

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Proficiency Scores by Occupation Codes

OCCUPATION CODES			SCALES		
			Prose	Document	Quantitative
	n	WGT N (/1,000)	PROF (SE)	PROF (SE)	PROF (SE)
Occupation code 308	68	449	287 (7.2)	287 (6.5)	291 (8.6)
Occupation code 307	45	280	285 (9.8)!	281 (8.6)!	292 (9.1)!
Occupation code 303	146	956	304 (5.1)	302 (4.3)	306 (5.3)
Occupation code 285	51	426	289 (12.4)	284 (12.2)	292 (16.4)
Occupation code 277	61	417	272 (10.0)	264 (13.9)	266 (14.0)
Occupation code 276	327	2,610	272 (3.8)	271 (3.9)	274 (3.2)
Occupation code 275	52	355	284 (10.7)	285 (10.6)	291 (12.2)
Occupation code 274	186	1,476	285 (5.5)	279 (4.4)	286 (5.2)
Occupation code 264	46	345	285 (7.4)	284 (7.9)	283 (7.7)
Occupation code 259	158	1,222	312 (4.4)	302 (4.9)	316 (5.4)
Occupation code 257	47	290	319 (8.9)!	299 (11.4)!	314 (9.7)!
Occupation code 254	88	761	320 (6.3)	309 (6.6)	327 (7.2)
Occupation code 253	68	528	313 (6.8)	307 (6.3)	321 (5.7)
Occupation code 243	379	3,105	295 (3.9)	288 (4.1)	298 (5.1)
Occupation code 234	53	345	324 (6.1)	323 (10.3)	314 (9.3)
Occupation code 229	51	300	327 (9.9)!	331 (8.0)!	328 (10.2)!
Occupation code 213	62	382	306 (8.4)	317 (8.2)	315 (8.0)
Occupation code 208	84	501	296 (8.6)	292 (9.3)	287 (10.7)
Occupation code 207	76	515	300 (6.9)	289 (7.2)	292 (5.9)
Occupation code 203	66	420	311 (10.2)	303 (11.9)	304 (14.7)
Occupation code 185	58	436	292 (6.7)	287 (7.4)	295 (6.6)
Occupation code 178	88	641	353 (6.7)	346 (7.7)	353 (5.9)
Occupation code 174	115	668	326 (6.6)	320 (7.0)	321 (6.9)
Occupation code 163	47	294	309 (12.1)	299 (8.9)	298 (12.1)
Occupation code 159	81	619	312 (7.3)	304 (7.7)	312 (8.3)
Occupation code 158	55	389	333 (8.7)	326 (7.9)	333 (8.9)
Occupation code 157	157	960	332 (4.5)	323 (5.0)	327 (5.2)
Occupation code 156	248	1,650	332 (3.2)	321 (2.7)	327 (3.3)
Occupation code 155	46	296	326 (7.7)	317 (7.1)	317 (9.8)
Occupation code 95	281	1,648	326 (3.6)	314 (3.7)	313 (3.8)

n = sample size; WGT N = population size estimate / 1,000 (the sample sizes for subpopulations may not add up to the total sample sizes, due to missing data); PROF = average proficiency estimate; (SE) = standard error of the estimate (the true population value can be said to be within 2 standard errors of the sample estimate with 95% certainty).

! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this statistic.

Source: U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992.

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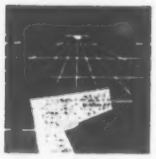

Proficiency Scores by Occupation Codes

OCCUPATION CODES			SCALES		
			Prose	Document	Quantitative
	n	WGT N (/1,000)	PROF (SE)	PROF (SE)	PROF (SE)
Occupation code 84	48	367	335 (10.4)	324 (10.1)	335 (11.4)
Occupation code 64	121	878	350 (5.5)	343 (5.3)	349 (6.8)
Occupation code 55	62	448	348 (6.5)	343 (5.8)	367 (6.1)
Occupation code 27	58	426	329 (11.6)	318 (10.7)	324 (9.1)
Occupation code 25	103	685	330 (5.0)	323 (4.7)	327 (5.5)
Occupation code 23	143	1,020	342 (4.2)	335 (5.2)	347 (6.0)
Occupation code 22	464	3,715	316 (3.5)	311 (3.3)	323 (3.5)
Occupation code 18	57	387	301 (7.2)	294 (7.7)	299 (7.1)
Occupation code 17	58	452	285 (10.1)	278 (9.1)	296 (9.3)
Occupation code 14	67	401	325 (8.7)	300 (9.0)	315 (11.3)
Occupation code 13	89	641	338 (8.1)	330 (8.1)	335 (6.2)
Occupation code 7	84	549	335 (5.4)	326 (7.4)	339 (6.4)

n = sample size; WGT N = population size estimate / 1,000 (the sample sizes for subpopulations may not add up to the total sample sizes, due to missing data); PROF = average proficiency estimate; (SE) = standard error of the estimate (the true population value can be said to be within 2 standard errors of the sample estimate with 95% certainty).

! Interpret with caution -- the nature of the sample does not allow accurate determination of the variability of this statistic.

Source: U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992.

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IN SEARCH OF COMMONALITIES

Institute for Educational Leadership
Center for Workforce Development
July 10, 1996

IN SEARCH OF COMMONALITIES

INTRODUCTION

As a part of the Institute for Educational Leadership's Center for Workforce Development transitional support project, a search to identify "commonalities" among skill standards of the 22 pilot projects and three independent skills projects[1] was undertaken. The purposes for such an undertaking are multiple. It is well recognized by most observers that one of the key reasons for the growing support of a voluntary national skill standards system is a desire to better communicate to all education and training providers, parents, and students the core knowledge and skill requirements needed to succeed in the workplace. A central expectation of the skill standards "community" is that they will be able to identify the common foundation of knowledge and skills needed across the majority of occupations within the economy.

There is not yet a generally accepted precise nomenclature around which one can discuss what is meant by the term skill standard. However, there is increasing acceptance that it is essential to use a taxonomy that differentiates a hierarchy of knowledge and skills requirements. At least three broad categories of skills are recognized as important; these include: 1) basic (academic and workplace basics); 2) cross-functional (essentially those identified by the SCANS effort and considered to be those which exist in most occupations across the economy); and 3) occupation specific skills. Obviously a task centered on the issue of commonalities among skill standards would focus on the first two categories. That has been the focus of this work.

To find commonalities, we built upon the work among the 22 pilot projects through the findings of a three stage Delphi processes conducted in 1994-95. The purpose of that Delphi process was to identify and document where there was agreement and disagreement around a common framework. It was recognized at the time the Delphi process was undertaken, some framework features would be driven by technical principles and others by philosophy. It was anticipated that it would be more difficult to gain consensus on certain features than others. Three aspects of skill standards were identified as the focus of the consensus-building process: 1) the meaning of a skill standard; 2) the information presented in a skill standard; and 3) the organization of skill standard information. Wherever possible the definitions that were being used to update and refine the Dictionary of Occupational Titles (now called O*NET) were used during the Delphi exercise.

A summary of the findings of the consensus building process (that included state education officials as well as representatives from all of the 22 pilot projects) are found on Table 1. A study of that table reflects general support for recognizing different types of skill categories. Yet, precisely what is a basic attribute versus a cross-functional versus an occupation specific remained unsettled among the 22 projects --- and others. They also present the greatest challenge in minimizing duplication of skill information since many basic and cross-functional skills relate to different skill standards within the same occupational area.

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[1]The three other projects are: The Academy of Residential Construction Carpentry Skill Standards, the Telecommunications Skill Standards project, and the Banking Skill Standards project. These three are included because they are industry sponsored projects which focus on career-entry and basic skills.

Table 1

Term: Definition	Support Rating	Percent Preferring Definition
Work Segment: *The division of work to which the standard applies. It defines what has to be done.*	3.5	42%
Essential Knowledge/Skills: *Information and abilities that are critical to performance of specific work.*	3.8	48%
Workplace Basic Skills: A. *Fundamental developed abilities (e.g., reading, mathematical application) that are required by specific work and that occur in some degree in virtually all jobs.*	3.6	32%
B. *Developed capacities (e.g., reading, critical thinking) that facilitate learning to perform work in general as well as specific work.*	3.3	35%
Cross-Functional Skills: *Generic skills that relate to performance of specific work and that tend to occur across relatively wide ranges of jobs or occupational clusters.*	3.7	58%
Occupation-Specific Knowledge: A. *Understanding, awareness, or familiarity with the facts, principles, processes, methods, or techniques for specific work.*	3.5	39%
B. *The principles needed to work with or apply a given skill in performing specific work.*	3.4	39%
Occupation-Specific Skills: *Set of activities or procedures that are performed for specific work.*	3.5	48%
Performance Criteria: *The measures and standards used to judge the ability of the worker to perform specific work.*	3.6	47%

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Methodology for this Study

As of March 1996 the source documents from which the statements were drawn were considered the final core standards documents from each project with the exception of the Grocer's and Laborers/AGC projects. To date the work that has been undertaken has organized 10 tables of material that has focused on the category of basic skills, using the current working definition of O*NET, see Table 2. O*NET has developed two types of basic skills categories -- content and process. The content areas, (Mathematics, Science, Writing, Speaking, and Active Listening) , sometimes fit the definitions used by the skill standards projects of basic skills as they are closely linked to academic knowledge and skill fields. The process skills (Critical Thinking, Active Learning, Learning Strategies, and Monitoring) are often not a basic skill classification within the skill standards projects. However, upon review of the occupation specific skill requirements of many of the skill standard projects there was often found statements that directly related to these type of process skills. Therefore, it became necessary, to undertake the more ambitious task of reviewing the occupation-specific skill sets or lists to develop the basic skills category -- the category of skills needed by entrants into the workforce.

Table 2
O*NET's SKILLS FRAMEWORK

Basic	*Cross Functional*	*Occupation-Specific*
Content		
ACTIVE LISTENING	PROBLEM SOLVING	[VARIED CATEGORIES]
MATHEMATICS	SOCIAL	
READING COMPREHENSION	TECHNICAL	
SCIENCE	SYSTEMS,	
SPEAKING	RESOURCE MANAGEMENT	
WRITING		
Process		
ACTIVE LEARNING		
CRITICAL THINKING		
MONITORING		
LEARNING STRATEGIES		

The materials that are presented include material culled from both basic and occupation-specific statements published by the national skill standards projects (and three other state/industry projects) under the basic skills categories planned for O*NET. Cross-functional skills have not yet been culled from the materials.

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While many of the included statements are considered by the individual standards projects to be "standards", the term "statement" is used because some projects have not distinguished clearly between their standards and related advisory statements about skills, abilities, attributes etc. Thus it should not be assumed that all of the materials contained herein are project standards, merely that they are contained within standards documents from each project.

There are a host of difficulties -- bumps in the road, if you will -- that a mapping exercise of this sort confronts. Among these are project differences in standards language, numbers of standards levels, and degree of specificity in language within each level. The limitations of the model being mapped against also figures in the bumpiness. In attempting to find standards statements culled from various categories assumptions had to be made about what project statements say and what they imply, especially in those instances in which the language is vague or is very much the jargon of industry.

The process for placing the statements was comprised of the following. For the basic skills category the standards documents of the projects were reviewed for categories labelled basic skills, foundation skills, employability skills or the like. If statements under these headings were found that also linked to O*NET basic skills categories (Active Listening, Mathematics, etc.) they were, in general, placed in the basic skills column under the appropriate O*NET category. Because a basic skill within O*NET is defined to be "capacities" that "promote or provide a foundation for learning other types of material" this was even done even in some cases where the skill was worded in an occupation-specific way. Thus while the popular sense of basic skills might be the Three R's at, perhaps, the eighth grade level, basic skills to O*NET simply means the skills preliminary to learning the skills distinctive to an occupation. Thus some skills that are basic for one occupation might be occupation or industry-specific for others. This, of course, means that the basic skills listed by different projects reflect very different levels of accomplishment within these skill areas.

For occupation-specific skills, project materials were reviewed for statements that expressed reasonably purely the essence of the basic skill as applied to the job. Statements that clearly <u>implied</u> the skill were occasionally found and used. Statements that only suggested the skill were not included.

Statements were kept whole: a statement containing two concepts that would link to different categories was not broken apart. If a statement wrapped reading and mathematics together it was not, in general, placed in a category. Exceptions were made so that there would be information for some projects that, were the rule imposed, would have none. And for the process skills multiple statement grouping were often used because it is difficult to illustrate some of these process skills with only one statement (these groupings are indented from the column margin).

The varied standards structures has made deciding which categories of information to include a new challenge for each pilot project document. A few projects made the task easy in the basic skills area by having a basic or employability skills area and only including material in that category that seems truly basic. Some projects tried to do this but ended up including occupation-specific or industry specific material.

Implications

WHAT IS A BASIC SKILL?

All projects addressed the issue of basic skills. Yet, it is clear from the review of the material that pilot projects could have benefitted from a common set of definitions regarding what is to be called a basic skill. The O*NET system did not exist at the start of the pilot projects' grants and thus there should be no expectation the categories used by O*NET would naturally "fall-out", nevertheless, it will be useful for the projects to examine the tables and consider whether some skill areas suggested by O*NET should be captured. Some of the O*NET basic skills are not found in some of the project documents at all. Examples of the learning-related skills, active learning and learning strategies were especially rare. Establishing the connection between project statements and the categories was easier for the content skills.

The NSSB as well as the pilot projects and those responsible for the development of O*NET should carefully consider the definitions to be ultimately incorporated in the basic skills category -- what are basic skills? Should both process and content be included? If so how can differentiations be made between the knowledge and skills required for entry into the occupation versus those same types of skills required for higher level or more specialized work.

IDENTIFYING THE BASIC SKILLS

A key issue that must be addressed by NSSB and others is how and who should be responsible for validating basic skills and knowledge that cross cut a substantial portion of jobs within the economy? What will be the most cost effective process to document these types of skills as well as the category of cross-functional skills?

TERMINOLOGY MATTERS

Agreement will need to be reached regarding the forms of expression. Even for the more common content skills basic skills have been expressed in some cases that are with such generality that comparisons across project lines are difficult. Wide variation in word choice makes establishing connections among different projects basic skills difficult on the basis of individual skill statements alone. The contextual details needed to establish the connection are usually not provided. It is not clear what a statement such as "Demonstrate

good reading skills" adds. And there are many statements of such generality in the pilots' documents.

PRESENTATION MATTERS

Another contributor to confusion is the lack of clarity about what the standard is -- or where it is -- in a pilot's publication. While some projects clearly mark a section of their document as the standard, more often it is implied that the document contents are, taken together, the standard. Also, long lists of tasks that do not provide the reader with a context of how the task fit into the various categories of skills even within a single occupational area will not provide the necessary guidance educators, trainers and perspective workers need. The Delphi Process recommendation that the Skill Standard Unit include linked Occupational, Basic and Cross-Functional Skills seems especially wise in light of our analysis.

MORE WORK IS AHEAD

This effort to find the commonalities of basic and cross-functional skills is but a beginning. It is not yet completed. For example, one of the obvious outcomes of such an exercise is to seek and find the common knowledge and skill requirements across the various projects. This work has yet to be completed, it will require the attention of a wide range of organizations and stakeholders. This document simply is a tool to be used.

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
ACS ChemTech	Read and understand procedures. Read and prepare diagrams. Read technical manuals and journals.	No applicable statements.	Employability Performance-Based Skill Standards -- Communication Skills
ACS ProcTechOptor	Read and follow procedures. Read and prepare diagrams.	Read and follow all Standard Operating Procedures associated with the maintenance of the processes, equipment and instruments before starting any work. Review and properly interpret all checklists associated with a process.	Employability Performance-Based Skill Standards -- Communication Skills Provide Routine and Preventative Maintenance ... -- Tasks Operate, Monitor, and Control Continuous Processes -- & Operate, Monitor, and Control Batch Processes -- Tasks
AEA AdminInfoSvcs	No applicable statements.	No applicable statements.	

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SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
AEA MfgSpec	No applicable statements.	No applicable statements.	
AEA Pre/PostSales	No applicable statements.	Plans reviewed & understood by all involved	Critical Function 5 -- Activity 3C

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
AGCLab ConcreteWorker	No applicable statements.	Read/interpret material safety data sheets (MSDs)	Horizontal Concrete Construction: Curing/Form Removal -- & Vertical Concrete Construction: Curing/Form Removal -- Workplace Skills, Knowledge, and Aptitudes
		Read and follow manufacturers' specifications/instructions.	Vertical Concrete Construction: Placement -- & Vertical Concrete Construction: Curing/Form Removal -- & Mass Concrete Construction: Placement -- Workplace Skills, Knowledge, and Aptitudes

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
AGC Concrete Worker Continued	Read/follow instructions.	Read/follow instructions.	Mass Concrete Construction: Curing/Stripping -- Workplace Skills, Knowledge, and Aptitudes
AWS Entry Welder	Identify details and specifications. Follow detailed directions. Use book mechanics(tables, index, etc.) Locate information - problem solving - use forms to locate information.	No applicable statements.	Basic Skills and Knowledge -- Reading
CHRIE Bellperson	Skill to read materials written at the 6th to 8th grade level with average comprehension and retention for that level.	No applicable statements.	Basic Skills -- Reading -Grade level 1
CHRIE Concierge	Skill to read materials written at the 6th to 8th grade level with average comprehension and retention for that level.	No applicable statements.	Basic Skills -- Reading -Grade level 1
CHRIE Front Desk Clerk	Skill to read materials written at the 6th to 8th grade level with average comprehension and retention for that level.	No applicable statements.	Basic Skills -- Reading -Grade level 1
CHRIE Reservationist	Skill to read materials written at the sixth to eighth grade level with an average comprehension and retention for that level.	No applicable statements.	Basic Skills -- Reading -Grade level 1

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SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
CHRIE Busser	**No applicable statements.**	**No applicable statements.**	
CHRIE Cashier	Skill in comprehending written sentences presented at a 6th to 8th grade level with average comprehension and retention for that level.	Verify customer billing information.	Basic Skills -- Reading -Grade level 1 Duty Area: Process Sales -- Task
CHRIE Host/ess	**No applicable statements.**	**No applicable statements.**	
CHRIE Server	**No applicable statements.**	**No applicable statements.**	

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SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
CORD HazMatTech	Locate, understand, and interpret written information in prose and in documents such as manuals, graphs, and schedules by being able to: determine the main idea or essential message identify relevant details, facts, and specifications infer or locate the meaning of unknown or technical vocabulary judge the accuracy, appropriateness, and plausibility of reports or other writing. Read and interpret blueprints, charts, curves, graphs, maps, plans, and spreadsheets from plotted and tabulated data.	Read and apply regulatory standards to ensure compliance in operations.	Employability Skills -- Basic Skills -- Reading Job Function A -- Supporting knowledge/skills Job Function H -- Supporting Knowledge/Skills
CORD Photonicatech	No applicable statements.	No applicable statements.	
EDC BiotechOccs	Read Technical Literature.	No applicable statements.	Task N-5

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
EIF ElectronicsTech	Read and apply various sources of technical information. Interpret written, graphic, and oral instructions.	No applicable statements.	Basic and Practical Skills -- Reading Basic and Practical Skills -- Communicating on the job
FarWst HealthCareOccs	Read charts, reports, and manuals.	No applicable statements.	Academic Foundation
FFA AgricBiotech	Read and comprehend other written documentation. Demonstrate understanding and relevance of SOP's.	No applicable statements.	Related Academic Skills -- Information
GATF Finish/Distrib	Communicate through reading, writing, and/or speaking. Read and understand and comply with relevant federal, state, local, and company regulations (e.g., OSHA and environmental regulations.	No applicable statements.	Core Skills -- Communication Skills Core Skills -- Safety

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
GATF Imaging	Read materials in order to follow directions and procedures, respond to correspondence, and interpret guidelines and manuals.	Receive and view disk files and hard copy from client and ensure that files match client inventory. Identify problems having to do with text, graphics, and images.	Core Skills - Communication Skills Job Engineering -- Pre-flight Assembly -- Job Intervention
GATF Press	Communicate effectively through reading, writing, and/or speaking. Read and understand safety bulletins and posters and communicate safety issues by reporting problems and defective safety devices.	**No applicable statements.**	Core Skills -- Communication Skills Core Skills -- Safety

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
GREF FrontEnd	Demonstrate reading skills.		Duties/Tasks: A/2,3,4,5,7&9; B/3,4,5; C/1,4,5,6,&7; D/1,2,3,4&5; E/1,3,4,5&6; F1,2,3,4,6,7,10,11,12&13; G/3&7; H/2&6; J/1,3,5,10,11&12; K/2,4&7; L/1,2,7&9; N/1,2,3,4&5 Enabling Competencies
		Read labels or identify logos.	
		Demonstrate reading skills for accurate pricing of items.	Duty/Task: F/1
		Demonstrate reading skills for generating order.	Duty/Task: L/6
		Demonstrate reading skills to understand safety/cleaning procedures	Duty/Task: L/8
			Duty/Task: M/4

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
GREF Frontline	Comprehend written information. Comprehend written information for assumptions biases Comprehend written information for cause/effect relationships. Comprehend written information for character traits. Comprehend written information for charts/tables/graphs. Comprehend written information for comparisons/contrasts. Comprehend written information conclusions. Comprehend written information for context Comprehend written information for evaluations/critiques Comprehend written information for main idea Comprehend written information for purpose Comprehend written information for rationale Comprehend written information for summaries Describe/explain perceptual effects for an emotional tone Describe/explain the purpose/strategy of word groups. Read job-related publications.		Related academic skills -- Language Arts General Workplace Skills

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SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
GREF Stock/Prod	Demonstrate reading skills. Read the calendars.		Duties/Tasks: A/1,2,3,4,5,6,8&9; B/3,4,5,6,8,9&10; C/2,3,4,5,7; D/2,6,7,8,9,10,13,14,15,16&17; E/1,3,4,5,6,7,8,9,10&11; F/1,3,,4,,6&8; G/3,4,6,7,8,10,12,13&14; H/1,2,3,4,5,6,7,8,9&10; I/3,4,5,6,7,9,10,13; J/2,3,4&5; K/1-16; L/3; M/1-9,12,14&15; N/1,9,14&15; O/2,4,5&9; P/2,3,7&9; Q/2,4,5,6,7,9 Duty/Task: Q/12 Enabling Competencies Duty/Task: A/2 -- Performance Step Duty/Task: A/5 -- Performance Step Duty/Task -- D/2
HSRI Comm Svc Work	No applicable statements.	No applicable statements.	

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
NATEF AutoTech	Adapt a reading strategy for all written materials, e.g. customer's notes, service manuals, shop manuals, technical bulletins, etc., relevant to problem identification, diagnosis, solution, and repair. Comprehends information - Written sequence Comprehends information - Written operator's manual	No applicable statements.	Narrative for Language Arts Related Academic Skills Related Academic Skills -- Language Arts
NATEF Collision	Adapt a reading strategy for all written materials, e.g. customer's notes, service manuals, shop manuals, technical bulletins, etc., relevant to problem identification, diagnosis, solution, and repair. Comprehends information - Written sequence Comprehends information - Written operator's manual	No applicable statements.	Narrative for Language Arts Related Academic Skills Related Academic Skills -- Language Arts
NECA InsideElecWire	...should be able to read and comprehend: the essential information contained in safety rules; instructions in the use and maintenance of tools and equipment; complex technical documents and code books; and graphs, charts and diagrams.	studies blueprints and specifictions. studies the blueprints and schematic diagrams for the system and reads the manual on the system.	Reading Occupational Standard I Occupational Standard XV

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
NCFAM CADD	Read and comprehend written information: the main idea the purpose the conclusion Identify written information when reading.	No applicable statements.	Related Academic Skills -- Communication Skills
NCFAM AdvMfgOcc	Read process information and follow instructions. Read material and describe concepts. Read documentation, such a computer manual, to determine actions for specific situations.	No applicable statements.	Communication and Teamwork

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
NRF SalesAssoc	Employees must read moderately detailed and complicated company policies, procedures, and announcements. These reading materials contain words and phrases that may be specialized (jargon and technical language) or words that have several meanings. All of the information employees need is stated clearly in the reading materials, but the employees must consider several factors in order to identify the course of action that will accomplish their goals. Employees are required to: understand the paraphrased definition of specialized words or phrases (jargon or technical terms) defined in these reading materials use jargon or technical terms appropriately in describing situations stated in these reading materials understand the meaning of acronyms defined in these reading materials figure out which definition of a word with multiple meanings is appropriate in the context of these reading materials apply information given in these reading materials to situations that are not directly described, but similar apply instructions or procedures with a number of steps to described situations. These instructions may include conditionals (if X happens, then you should do Y).	No applicable statements.	Foundation Skills - - Reading for Information (WorkKeys)

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SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
NTMA MachLevel1	Locates, understands, and interprets written technical and non-technical information in documents commonly found in the metalworking industry. These documents contain short and simple sentences, paragraphs and passages, phrases, quantitative information, specialized vocabulary, graphs, charts, schedules, simple instructions, and multi-step directions. All documents are written in standard english.	Examples of Occupation-Specific: Read blueprints. Read tool crib inventory. Read the handbook. Read process plans.	KSAO 1 1, Reading Duty Area 1 ,2,3&4-- Activity Duty Area 1 – Activity Duty Area 1&2 -- Activity

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
NTMA MachLevel2	Locates, understands, and interprets written technical and non-technical information in documents commonly found in the metalworking industry. These documents contain short and simple sentences, paragraphs and passages, phrases, quantitative information, specialized vocabulary, graphs, charts, schedules, simple instructions, and multi-step directions. All documents are written in standard english.		KSAO 1.2, Reading
		Read blueprints.	Duty Area 1,2,3&4 -- Activity
		Read tool crib inventory.	Duty Area 1 -- Activity
		Read the handbook.	Duty Area 1,2&4 -- Activity
		Read inspection plan.	Duty Area 3 -- Activity

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
UTSA MaritimeTech	Read, use, and follow written directions found on equipment, containers, and packages, or arts, sketches and/or schematics. Read, use, and follow written directions found on equipment, containers, and packages, or in code books, manuals and reference material. Read, use and follow written directions found on equipment, containers and test kits or in code books, manuals or reference materials. Read, use, and follow instructions found on equipment, test kits, containers and packages and in code books, manuals and reference material. Read, use, and follow instructions written on equipment and containers and in code books, manuals, catalogs and reference materials. Read, use and follow written instructions found on equipment, containers and packages, and in test kits, manuals and reference material. Read, use and interpret manifests, records, permits, code books, Material Safety Data Sheets, and historical data and archive	No applicable statements.	Standard 1 -- Basic Skills/Knowledge Standard 2 -- Basic Skills/Knowledge Standard 3 -- Basic Skills/Knowledge Standard 4 -- Basic Skills/Knowledge Standard 5 -- Basic Skills/Knowledge Standard 6 -- Basic Skills/Knowledge

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
UTSA ProdWorker	Read labels and/or instructions attached to or found on goods/products, packages and containers. Read labels attached to goods/products and packages, and follow directions found on/in equipment, containers, charts, and manuals. Read labels attached to garments, goods and packages, and follow written directions found on equipment and containers, and in reference manuals. Read labels attached to goods/products and packages, and directions found on/in equipment manuals and references. Read labels attached to goods/products, and follow directions written on work orders, sales receipts and equipment and in manuals. Read labels attached to goods/products and packages, and follow directions found on equipment and containers, and in manuals.	No applicable statements.	Standard 1 -- Basic Skills/Knowledge Standard 2 -- Basic Skills/Knowledge Standard 3 -- Basic Skills/Knowledge Standard 4 -- Basic Skills/Knowledge Standard 5 -- Basic Skills/Knowledge Standard 6 -- Basic Skills/Knowledge
VTECS HACRTech	Follow oral and written directions.	Read and comprehend technical materials such as codes and regulations, installation, maintenance, and service manuals, flowcharts, tables, graphs, schematics, and decision trees.	Workplace Behaviors -- Workplace Communication Occupation-Specific Knowledge -- Communication

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
OTHER STANDARDS PROJECTS			
ARC ShellCarpenter	**No applicable statements.**	**No applicable statements.**	
BKI Data/ItemProcess	Read materials in order to follow directions and procedures, respond to correspondence, and interpret guidelines.	Understand and follow equipment procedure manuals.	Foundation Skills - - Communication Skills Function: Operate computer systems – Key activity: Operate and troubleshoot computerized systems to ensure quality control
BKI LoanProcess	Read materials in order to follow directions and procedures, respond to correspondence, and interpret guidelines.	**No applicable statements.**	Foundation Skills - - Communication Skills
BKI Sales/Service	Read materials in order to follow directions and procedures, respond to correspondence, and interpret guidelines.	**No applicable statements.**	Foundation Skills - - Communication Skills

SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
TEL CustService	Read materials in order to follow directions and procedures, respond to correspondence, and interpret guidelines, graphs, charts, and maps.	Use reference materials to determine rates and customer operation instructions. Use tariff lists and specialized reference materials in order to make decisions and provide information when assisting customers.	Foundation Skills -- Communication Skills Function: Provide directory information to customer -- Key activity: Assess and address customer needs Function: Market and sell company communications products and services -- Key activity: Identify customer needs and provide product and service information
TEL InfoSystems	Read materials in order to follow directions and procedures, respond to correspondence, and interpret guidelines, graphs, charts, and maps.	No applicable statements.	Foundation Skills -- Communication Skills

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SKILL STANDARDS PILOT PROJECTS	READING COMPREHENSION Basic Skills	READING COMPREHENSION Occupation-Specific	STANDARDS CATEGORY
TEL Natinstall	Read materials in order to follow directions and procedures, respond to correspondence, and interpret guidelines, graphs, charts, and maps.	Read on-line documentation, computer printouts, test data, and specialized reference materials. Read and interpret information provided by the job ticket dispatch, service order, work order, record maps, and/or mechanized dispatch system.	Foundation Skills -- Communication Skills Special Prerequisites for Network Installation and Maintenance -- Technical Reading Skills Function: Install, test, and maintain equipment

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
ACS ChemTech	Write memos and letters. Document incidents. Write reports. Keep records. Keep notes for shift transfer. Maintain an accurate notebook. Maintain logs and notes. Write technical reports. Write executive (management) summaries.		Employability Performance-Based Skill Standards -- Communication Skills
		Label all chemicals, materials, tools, and equipment with appropriate safety, health and environmental details.	Maintain a Safe and Clean Laboratory... -- Tasks
		Label all samples and chemical materials with information containing chemical name, formula, toxicity, date stored, expiration date, appropriate symbols, and other pertinent information.	Sample and Handle Chemical Materials --Tasks
		Record and report data.	Conduct Physical Tests --Tasks
		Record data and present results as appropriate both for single samples and to display trend. Record and report data.	Perform Chemical Analysis -- Tasks

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
ACS ChemTech (cont'd)		Record results with appropriate detail. Report results as appropriate.	Perform Instrumental Analysis -- Tasks
		Describe procedures in writing as appropriate for the intended audience. Report results.	Plan & Design Experiments -- Tasks
		Document all findings in laboratory notebook, obtain witness signatures, and discuss results with team members.	Synthesize Compounds – Tasks

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SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
ACS Proc Tech Op for [redacted]	Maintain logs and notes. Prepare shift turnover reports. Write clear instructions. Complete and route forms. Report data using prescribed procedures. Fill out checklists. Write procedures.		Employability Performance-Based Skill Standards -- Communication
		Properly label all materials in the plant.	Maintain Safety, Health, and... Tasks
		Properly label all materials. Maintain material inventories. Verify and prepare shipping papers, or supply the data to the appropriate shipping clerk.	Handle, Store, and Transport... -- Tasks
		Complete all required reports to describe process activities, discrepancies, and maintenance. Record and report data.	Operate, Monitor, and Control Continuous Processes -- Tasks
		Implement and develop, if necessary, a preventive maintenance schedule.	Provide Routine and Preventive Maintenance and Service... -- Tasks
		Label samples appropriately and according to any prescribed procedures. Report results using prescribed procedures or effective presentation techniques to appropriate personnel. Enter data into computers and other appropriate logs. Prepare proper paperwork to submit samples to the laboratory.	Analyze Plant Materials -- Tasks

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SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
AEA Admn/Info	No applicable statements.	Schedules are clear, accurate, complete	Critical Function 2: Manage Schedule & activities to achieve objectives – Activity
AEA Admn/Info		Work processes documented clearly.	Critical Function 4: Develop, implement, and evaluate work processes & procedure – Activity 1C
		Documentation is accurate & concise.	Critical Function 5: Generate and maintain documents and information – Activity 2A
		Documentation style conforms to requirements.	– Activity 2B

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
AEA MfgSpec	**No applicable statements.**	Test results are accurately documented.	Critical Function 1: Ensure production process meets business requirements -- Activity 3G
		Prototype details documented.	Critical Function 4: Determine design workability & manufacturability - - Activity 1A
		Recommendations for improvement are documented.	Critical Function 4: Determine design workability & manufacturability - - Activity 2D
		Documentation of material requirements made to stock person.	Critical Function 6: Select and optimize available machinery to meet process requirements. -- Activity 2G
		Documentation in (sic?) up to date, accurate & complete	-- Activity 2H
		Recommendations and improvements are documented.	-- Activity 3E
AEA Pre/PostSales	**No applicable statements.**	**No applicable statements.**	

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
AGCLab ConcreteWorker	Complete employment forms.	**No applicable statements.**	Workplace Basic Skills
AWS Entry Level Welder	Write technical words accurately. Spell task-related words correctly. Enter appropriate information and accurately transfer information to forms.	Prepare Time or Job Cards (Reports or Records)	Related Skills and Knowledge -- Common Work Assignments
CHRIE FrontDeskClerk	Skill to organize simple technical data and handwritten data to match pre-supplied forms.	Maintain Log Book.	Basic Skills -- Communication -- Written/Data Sheets Duty Area -- Maintain Administrative Systems
CHRIE Busser	**No applicable statement.**	**No applicable statements.**	
CHRIE HostVess	**No applicable statement.**	Maintain Waiting List. Take Reservations.	Duty Area -- Seat the Customer
CHRIE Cashier	Skill in creating properly written sentences representing an 8th grade to 10th grade competency level	**No applicable statements.**	Basic Skills -- English --Written Sentences Level 1
CHRIE Concierge	Written data sheets: skill to organize simple technical data and handwritten data to match pre-supplied forms.	**No applicable statements.**	Basic Skills -- Written/Data Sheets

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
CHRIE Bellperson	Skill in creating properly written sentences representing an 8th to 10th grade competency level.	Maintain Log Books.	Basic Skills -- English Written Sentences Level 1 Duty Area -- Serve the Guest
CHRIE Reservationist	Skill in creating properly written sentences representing an 8th grade to 10th grade competency level.	No applicable statements.	Basic Skills -- English -- Written Sentences Level 1
CHRIE Server	Skill in creating properly written sentences representing an 8th grade to 10th grade competency level.	Take Customer Orders.	Basic Skills -- English --Written Sentences Level 1 Duty Area -- Serve Customer At the Table

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
CORD HazMatTech	Communicate thoughts, ideas, information, and messages in writing, being able to: -- create documents such as letters, memos, directions, manuals, reports, graphs, and flow charts -- develop supporting documentation to the appropriate level of detail -- revise for correct information and appropriate emphasis -- edit for form, grammar, spelling, and punctuation.	Compile and maintain a hazardous-materials inventory Compile and maintain documentation of hazardous materials, such as: – chain of custody – equipment calibration and maintenance -- exception reports – field notebooks – incident documentation -- laboratory data -- manifests -- MSDSs – purchase orders – shipping documents -- vendor invoices Compile and maintain records to prepare compliance reports. Ensure current MSDSs are available in the workplace. Operate and maintain auditable record-keeping systems in accordance with regulatory requirements. Conduct and maintain a hazardous-waste inventory. Identify and maintain an inventory of empty and full containers. Compile and maintain personal health and safety records.	Job Function – Compile, record, and maintain ... Supporting knowledge/skills

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SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
CORD HazMatTech		Record and maintain documentation of operations activities. Assist and contribute to the development and revision of plans and reports such as: --assessment plans -- health and safety plans -- initial sampling plan -- remediation plan -- risk-assessment plan -- site-closure plan -- standard operating procedures -- waste-minimization plan Prepare and maintain hazardous-waste manifests and associated documents for inspection.	Job Function -- Operate hazardous-materials and hazardous-waste treatment... Supporting knowledge/skills
CORD PhotonicsTech	**No applicable statements.**	**No applicable statements.**	
EDC Biotechnology	Communication - written	Writing logical instructions. Maintaining records, logs, protocols.	General Work Skills Industry-related skills
EIF ElectronicsTech	Use effective written skills. Write technical reports, letters, and memoranda as appropriate to the audience. Document work projects, procedures, tests, and equipment failures.	**No applicable statements.**	Basic & Practical Skills -- Communicating on the Job

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
FarWst HealthCareOcc	Read and write charts, reports,and manuals.		Core Standards -- Academic Foundation
		Follow facility policies and procedures.	Therapeutic Cluster -- Data Collection
		Document actions.	Therapeutic Cluster -- Implementing Procedures
		Produce proper documentation.	Diagnostic Cluster -- Procedure
		Prepare various reports.	Information Services -- Analysis
		Transcribe health information.	Information Services -- Documentation

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
FFA Agribotech	Document activities immediately. Maintain proper laboratory notebook. Keep accurate records. Write technical summaries. Write summaries of results for reports. Maintain a legible laboratory notebook. Write a business letter and memo. Proofread and edit written materials for spelling and grammatical correctness.	No applicable statements.	Employability Skills -- Information Technical Skills -- Technical Communication Skills Related Academic Skills -- Communications -- Written Communications
GATF Fresh/Dsrv	Communicate through reading, writing, and/or speaking.	Prepare shipping documents for both domestic and international delivery.	Core Skills --. Communication Skills Mailing and Distribution -- Function: Mailing and Distribution
GATF Imaging	Use correct English spelling, grammar, and punctuation to produce logical and accurate written correspondence, instructions, and documentation.	Document any file errors and their resolution.	Core Skills -- Communication Skills Job Engineering -- Pre-flight

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
GATF Press	Communicate effectively through reading, writing, and/or speaking.	Understand how to record technical data and performance results.	Core Skills --, Communication Skills Standards for Press Operating and Supporting Functions -- Quality Control
GREF FrontEnd	Clearly communicate directions orally and/or written. Demonstrate writing skills. Write accurate and legible messages.		Duty: Performing Customer Services --Task 04 -- Enabling Competencies Duties/Tasks: A/9; C/5; D/3&4; G/4; H/5; I/2,5,6,&7; J/3,5,6,7,9,10,11& 12; K/4,5,&7; L/5,7&9; N/1,2,3 &5 -- Enabling Competencies Duty A -- Task 07 -- Enabling Competencies

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
GREF FrontEnd (cont'd)	Compose/edit oral and written drafts. Compose/edit forms/documents. Compose/edit notes. Compose/edit paragraphs. Compose/edit paragraphs for details. Compose/edit paragraphs for sequence. Compose/edit paragraphs for topic sentence/main idea. Compose/edit reports/essays for information requests. Compose/edit reports/essays for supplying information. Compose/edit sentences. Compose/edit sentences for completeness. Compose/edit sentences for spelling. Compose/edit sentences for subject/verb agreement. Compose/edit sentences for subjects. Compose/edit sentences for verbs.		Related Academic Skills -- Language Arts

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SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
GREF Stock/Prod	Demonstrate Writing Skills		(Duties/Tasks: A/1,3,4,7,8&9; B/1,3,4,5,6,8,9&10; C/1,2,3,4,5,6,&7; D/2,5,6,8,9,11,13, 14,15,&16; E/2,5,7,8,&10; F/1,6,&8; G/3,4,8,11,14, &15; H/8,9,&10, I/3,4,5,6,7,&13; J/2,3,4&5; K/1,3,5,6,7,8,10,12 &16; L/11; M/14&15; N/8&9; O/2,5&9; P3; Q/1,5,7,9&10
	Compose/edit forms/documents. Compose/edit notes. Compose/edit reports/essays for supplying information.		Related Academic Skills -- Language Arts

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
HSRI CommSvcWork	No applicable statements.	Uses terminology appropriately and accurately in work environments such as ..., written correspondence ..., etc. Accurately documents and reports the incident according to regulations. Records data neatly, coherently, accurately and objectively. Writes effectively using proper grammar, correct spelling and sentence structure. Consistently uses respectful language in all written communication.	Skill Standard 2C -- Activity 2Cb Skill Standard 10B -- Activity 10Bc Skill Standard 12A -- Activity 12Aa Skill Standard 12A -- Activity 12Ab Skill Standard 12A Activity 12Ad

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
NATEF AutoTech	Write clear, concise, complete, and grammatically accurate sentences and paragraphs.	Write warranty reports and work orders to include information regarding problem resolution and the results of the work performed for the customer or manufacturer.	Narrative for Language Arts Related Academic Skills
	Write job application letter. Complete job application form. Complete state and federal tax forms. Complete employees withholding allowance certificate Form W-4. Prepare written communication. Write a letter of resignation.		Workplace Skills
	Composes/Edits Reports/Essays Summaries. Composes/Edits Sentences.		Related Academic Skills Crosswalk - Language Arts/Communication Skills

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SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
NATEF Collision	Write clear, concise, complete, and grammatically accurate sentences and paragraphs. Write job application letter. Complete job application form. Complete state and federal tax forms. Complete employees withholding allowance certificate Form W-4. Prepare written communication. Write a letter of resignation. Adapts Strategy Writing. Composes/Edits Notes. Composes/Edits Reports Summaries. Composes/Edits Sentences.	Write warranty reports and work orders to include information regarding problem resolution and the results of the work performed for the customer or manufacturer.	Narrative for Language Arts Related Academic Skills Workplace Skills Related Academic Skills Crosswalk - Language Arts/Communication Skills
NECA ElecConstruc	communicate in writing with others.	No applicable statements.	Preparing for a Career as an Electrical Construction Worker
NCFAM AdvMfg	Use correct punctuation. Use correct spelling. Write with accuracy, brevity, and clarity. Organize material with a logical flow. Prepare a resume and letter of application/interest. Fill out an application for employment.	Write the steps of a manufacturing process using sentences and statements as appropriate.	Communication and Teamwork Workplace Skills

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SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
NCFAM AdvMfg	Compose and edit using correct punctuation: sentences paragraphs written drafts oral drafts. Compose and edit sentences or paragraphs for completeness/irregular expressions/modifiers/cause and effect relationships/paragraph coherence/paragraph transitions. Compose and edit reports, essays, information requests, persuasive text, proofs and revisions, summaries, social communications and business letters. Compose and edit general forms or documents. Compose and edit audio-visual aids. Compose and edit notes. Spelling and vocabulary: - compose and edit sentences using correct spelling. - identify information and written abbreviations - apply and use definitions.	No applicable statements.	Related Academic Skills -- Communication Skills

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
NRF SalesAssoc	Employees' writing conveys information clearly. All of the sentences in the writing are complete. Writing does not contain any slang. There may be a few minor mechanical errors, but these errors do not interfere with understanding the meaning.	Maintain key information on customers Handle transactions and related paperwork	Foundation Skills; Work Keys: Writing Duties & Tasks Module 1, Element 1.2.7 Duties & Tasks Module 2, Element 2.3.2

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
NTMA MachLv1	Communicates technical and non-technical information, messages, and ideas in writing using standard English commonly found in the metalworking industry. This writing includes the completion of forms, information sheets, reports, group meeting materials, and short memos.		KSAO Area -- KSAO 1: Writing
		Write instructions on the process plan	Duty Area 1, Tasks: Prepare a process plan
		Write a record of job activities	Duty Area 2, Tasks: Benchwork -- Activity Layout -- Activity Operate machine tools -- Activity
		Write a record of inspection of activities	
		Write a record of adjustment and improvement activities	Duty Area 3, Tasks: Inspection -- Activity Control -- Activity
			Duty Area 4, Tasks:

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
NTMA		Write a record of maintenance activities. Fill out history forms	Duty Area 5, Tasks: Housekeeping -- Activity Machine tool PM -- Activity Tooling maintenance -- Activity
		Write a record of the activities involving the handling and storage of standard and hazardous materials	Duty Area 6, Tasks: Operations and handling -- Activity HazMat handling & storage -- Activity Material storage -- Activity
		Write detailed plans	Level II
		Write up the statistical report	Duty Area 1, Tasks: Process Planning -- Activity
			Duty Area 2, Tasks: Statistical capability study -- Activity

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
NTMA Mach/v2	Communicates technical and non-technical information, messages, and ideas in writing using standard English commonly found in the metalworking industry. This writing requires the use of coherent paragraphs composed of complete sentences.		KSAO Area -- KSAO1: Writing
		Write detailed plans	Duty Area 1 -- Task: process planning -- Activity
		Write up the statistical report	-- Task: Statistical capability study -- Activity

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
UTSA MaintenceTech	Write words, numbers, sentences and reports, and record simple statistical data.		Standard 2 -- Basic Skills/Knowledge
		Use and maintain manifests, permits, records and archives to document work activity, equipment history, safety/security issues, utility usage and/or environmental control system operations.	Standard 2 -- Occupation-Specific Skills/Knowledge
	Write words/numbers, sentences and reports legibly, using signed, single and multiple digit numbers.		
		Understand and document the schedule for preventive maintenance to ensure system integrity, adherence to regulatory guidelines, and a safe and comfortable work environment.	Standard 3 -- Basic Skills/Knowledge
		Communicate verbally and/or in writing, with supervisors, managers, engineers, contractors and/or local officials regarding system integrity, maintenance or malfunction	Skill Standard 3 -- Occupation-Specific Skills/Knowledge
		Communicate, verbally and in writing with contractors, vendors, suppliers and local officials.	
	Convey information verbally, verbally or in writing, to workers, suppliers, contractors, and local officials using basic trade vocabulary.		Skill Standard 4 -- Occupation-Specific Skills/Knowledge
	Write words, numbers, sentences, reports and data legibly, using trade terminology and notations.		Skill Standard s 5 &6 -- Basic Skills/Knowledge
	Write reports, memorandums, and statistical data legibly, using basic trade vocabulary and notations.		
		Use manifests, permits, records and archives to document work, equipment operations and history, safety issues and usage, and verify environmental control integrity.	Skill Standard s 5 -- Basic Skills/Knowledge

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
UTSA ProdWorker	Record information/data in logs, manifests, and reports and on charts, using trade vocabulary and proper unit notations. Compare, read and legibly write alphabet letters, words, names, sentences, and numbers. Read/write work orders, repair tickets, receipts and/or reports. Read/write work orders, sales orders or receipts, log book entries and reports.	Use, maintain and submit/file equipment logs, production records, reports and time cards/sheets in an accurate, efficient and professional manner Use, maintain,update and submit/file equipment logs, production records, incident reports and time cards in an accurate and timely manner.	Skill Standard 2 -- Basic Skills/Knowledge -- Occupation-Specific Skills/Knowledge Skill Standards 3 & 6 -- Basic Skills/Knowledge -- Occupation-Specific Skills/Knowledge Skill Standard 4 -- Basic Skills/Knowledge Skill Standard 5 -- Basic Skills/Knowledge
VTECS HACRTech	Prepare written communication.	Maintain technical and diagnostic notes, compile data and information to complete reports, forms, records, warranties, contracts, and invoices, and compose technical reports.	Workplace Behaviors Occupation-Specific Knowledge.

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
ARC ShellCarpenter	No applicable statement.		
BKI DataProcessing	Write effectively; convey thoughts effectively in correspondence, memos, and reports, using correct English spelling, grammar, and punctuation.	Input account information into an electronic information management system. Keep records current and back-up information.	Foundation Standards -- Communication Skills Function: Enter data to maintain accurate account records -- key activities
BKI LoanProcessing	Write effectively; convey thoughts effectively in correspondence, memos, and reports, using correct English spelling, grammar, and punctuation.	No applicable statements.	Foundation Standards -- Communication Skills
BKI Sales/Service	Write effectively: Convey thoughts effectively in correspondence, memos,and reports, using correct English spelling, grammar, and punctuation.	Maintain sales records.	Foundation Standards -- Communication Skills Function: Sell financial products and services --

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
TEL Customer Svc	Write effectively: understand the importance of and use correct English spelling, grammar, and punctuation in proofed and edited written correspondence, memos, reports, and instructions	Prepare reports using accurate technical codes. Create and maintain records within area of responsibility.	Foundation Skills -- Communication Skills Function: Provide administrative support -- Key activity: Perform standard clerical tasks -- .. what must know and do?

SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
TEL InfoSystems	Write effectively: understand the importance of and use correct English spelling, grammar, and punctuation in proofed and edited written correspondence, memos, reports, and instructions.	Store and process information. Prepare accurate documentation and necessary paperwork. Write and edit publications using appropriate software. Write technical procedures.	Foundation Skills -- Communication Skills Function: Maintain computerized information management systems -- key activity Function: Provide administrative support -- Key activity -- Key activity -- Create informational, procedural, and technical publications -- what must know and do?

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SKILL STANDARDS PILOT PROJECTS	WRITING BASIC SKILLS	WRITING OCCUPATION-SPECIFIC	STANDARDS CATEGORY
TEL Nebraska/Maine	Write effectively: understand the importance of and use correct English spelling, grammar, and punctuation in proofed and edited written correspondence, memos, reports, and instructions	Prepare technical documents and reports. Maintain and/or update records using correct coding, formatting, and/or forms in relation to tasks performed.	Foundation Skills - - Communication Skills Function: Provide administrative support -- key activities -- Keep accurate documentation and complete necessary paperwork

The Norback Job Literacy Structure

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INTRODUCTION

The Norback Job Literacy Structure is an empirically-based list of skills built from the workplace. It was developed as a result of 10 years of research which built first upon the Prose, Document and Quantitative categories of the national adult assessments done by Educational Testing Service, and then expanded as more job groupings were analyzed. To date 39 job groupings have been analyzed across 43 settings, including industry, government and health care.

The skills listed can be used along with the tasks and materials from the workplace (for example, charts, gauges, graphs, and forms) to improve the credibility of customized instruction and to build instruction with high functional context (that is, instruction that incorporates the context in which the skills will be used). The skills listed in the Job Literacy Structure can also be used as a guideline or starting point for a literacy skills analysis. Ideally, a literacy skills analysis should include the following six steps:

1. Review job descriptions to identify possible types of materials used on the job

2. Conduct personal interviews of workers to gather materials and related information

3. Edit and condense the information collected

4. Identify the literacy skills needed to perform the job tasks using the job materials

5. Have Advisory Committees of workers and supervisors review the results to check for completeness

6. Identify the common skills that are required across job groupings.

If all of the above six steps cannot be included, the following guidelines are important:

* Has the analyst talked with workers?
* Has the analyst talked with supervisors?
* Has the analyst asked both workers and supervisors about future requirements?
* Has the analyst identified types of materials used on the job?
* Has the analyst identified the literacy skills needed to process the materials for the specific job task?
* Has vocabulary from the materials been incorporated into the curriculum?

JOB LITERACY CATEGORIES OF SKILLS

IDENTIFIED TO DATE

Quantitative

1. Formulate Problems
2. Add and/or Subtract
3. Multiply and/or Divide
4. Other Arithmetic Processes
5. Numbers and Counting
6. Telling Time
7. Linear, Weight, Volume and Other Measures
8. Scales and other Gauge Measures
9. Geometry

Document

10. Select
11. Process Forms
12. Process Illustrations
13. Process Tables
14. Process Graphs, Pie Charts, Bar Charts

Prose

15. Reading
16. Reference Systems
17. Vocabulary
18. Writing, Grammar, Editing, Spelling

19. Following Directions

20. Identification

21. Computer-Related Skills

22. Synthesizing across Formats

23. Contingent Decision-Making/Analysis/Troubleshooting

24. Basic Communication: Working with Other Parties in the Communication System

25. Basic Communication: Adjusting to the Limitations of Materials

26. Basic Communication: Communicating about Actions and Procedures

QUANTITATIVE

Formulate Problems

1. Infer from printed directions whether task involves adding or subtracting
2. Infer from printed directions whether task involves multiplying or dividing

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Add and/or Subtract

Add (single operation)

1. Add integers
2. Add decimals
3. Add fractions
4. Add mixed numbers (integers and fractions)
5. Add printed time
6. Add linear, weight & volume measures

Subtract (single operation)

7. Subtract integers
8. Subtract decimals
9. Subtract fractions
10. Subtract mixed numbers
11. Subtract printed time
12. Subtract linear, weight and volume measures

Estimate

13. Determine an estimate of a sum or difference (integers, fractions or decimals)

Combination

14. Use addition and/or subtraction to solve problems involving two or more of the following: integers, mixed numbers, fractions and/or decimals

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Multiply and/or Divide

Multiply and/or Divide

1. Multiply and/or divide integers
2. Multiply and/or divide decimals
3. Multiply and/or divide fractions
4. Multiply and/or divide mixed numbers (integers and fractions)
5. Multiply and/or divide printed time
6. Multiply and/or divide linear, weight and volume measures (e.g., liquid, dry, degree)

Estimate

7. Determine an estimate of a product or quotient (integers, fractions or decimals)
8. Round integers or decimals

Combination

9. Use multiplication and/or division to solve problem solving two or more of the following: integers, mixed numbers, fractions and/or decimals

Other Arithmetic Processes

1. Use calculator for multiplication and/or division
2. Use calculator for addition and/or subtraction
3. Determine averages
4. Solve ratio and proportion problems, including reducing fractions to lower terms
5. Solve problems that combine more than one process (e.g., addition and multiplication, multiplication and division)
6. Solve problems involving units of measurement that combine more than one process (e.g., addition and multiplication, multiplication and subtraction)
7. Solve problems that require conversion
8. Read and understand information from scales to solve math problems
9. Use mathematical processes to solve word problems
10. Read and understand U.S. money (e.g., 50 cents is half of a dollar)

Numbers and counting

1. Read or write numbers in sequence
2. Read or write a number (digits, integers, fractions and decimals)
3. Read or recognize the meaning of percentages
4. Read and understand telephone and telefax numbers
5. Count by intervals of one, two, five or ten
6. Match numbers with words used as codes or labels
7. Determine which number, in a group of numbers, is of greatest or least value
8. Compare and/or match numbers from two different sources
9. Sort items based on the numbers they are labeled with

Telling Time

1. Tell time using a clock
2. Read and understand printed time
3. Read and understand printed military time
4. Read and understand the relationship of time on a clock to printed time
5. Read and understand dates and days of the week
6. Read and understand foreign dates

Linear, Weight, Volume and Other Measures

1. Read and understand U.S. standard units of length (e.g., inches, feet).

2. Read and understand metric system units of length (e.g., meters).

3. Read and understand U.S. standard measures of weight (e.g., ounces, pounds).

4. Read and understand metric system measures of weight (e.g., grams)

5. Read and understand U.S. standard measures of volume (e.g., pints, quarts).

6. Read and understand metric system measures of volume (e.g., liters)

7. Read and interpret micrometers, calipers

8. Read and understand measures of temperature in degrees Fahrenheit.

9. Read and understand measures of temperature in degrees Centigrade.

10. Read and understand job-specific measures of pressure (e.g., pounds per square inch or PSI).

11. Read and understand job-specific measures of flow (e.g., gallons/min., milliliters/min.) or speed (inches/min., rpms or revolutions/min.).

12. Read and understand job-specific measures (e.g., weight/foot in pounds).

13. Read and understand exact job-specific measures (e.g., standard cubic ft./min/., pounds per sq. inch gauge) due to working with a vacuum.

14. Read and understand job-specific measures of electricity: resistance (ohms), electrical current (amps) and the line "pressure" (volts).

Scales and other Gauge Measures

1. Read and interpret the markings on a scale
2. Calibrate a scale
3. Read and interpret readings on test equipment
4. Read and interpret a digital or computerized scale
5. Read and interpret the markings on a gauge

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Geometry

1. Read and understand measures in terms of angles (e.g., 90 degrees)

Document

Select

1. Determine which form in a group of forms is of relevance to the problem

2. Determine which graph or pie or bar chart in a group of graphs or charts is of relevance to the problem

3. Determine which illustration in a group of illustrations is of relevance to the problem

4. Determine which table in a group of tables is of relevance to the problem

5. bc) (S) Highlight important information through language, underlining, or placement of materials

6. bc) (S) Leave out information that may be unimportant, already known, or available elsewhere

7. bc) (R) Select important or relevant information to attend to

8. bc) (R) Attend to new or changed information

9. bc) (R) Attend to information needed to tailor actions for a particular customer

10. bc) (S) Use conventional formats (for example, a number and the word 'all,' or selecting graphical versus text format) for expressing information appropriately

11. bc) (R) Interpret conventional formats for expressing information

Forms

Locate

1. Locate the space on a form to enter data

2. Locate information using a completed form

3. Find information by skimming or scanning an entire form.

Copy (locate and transfer)

4. Transfer or copy exact data from other sources onto appropriate section of a form (e.g., copy data from intersection of table columns and rows)

Cycle

Generate

5. Enter, create or generate data into the appropriate spaces on a form

6. Write a description of an activity or transaction in appropriate section of a form

Integrate

7. Compare information using a completed form to other information internal to that form

8. Verify that information in that space is appropriate

9. Compare information on the form to information in external source

Illustrations (Pictures, Diagrams, Schematics, Maps)

Cycle (or "locate" if only 1 locate)

1. Locate and use parts of a picture (e.g., labels, numbers)

2. Locate and interpret specific details of a diagram

3. Locate and use parts of a schematic

4. Locate and interpret specific details of a map
   (e.g., state borders, a mountain range, a particular city)

Generate

5. Update a schematic or part of a schematic.

Integrate

6. Use a key to locate and interpret information in a picture

7. Use a key to locate and interpret information in a diagram

8. Use a key to locate and interpret information in a schematic

9. Use a key to locate and interpret information in a map

10. Use a scale to interpret information in a diagram.

11. Use a scale to interpret information in a schematic.

12. Utilize information from a picture, diagram, schematic or map to compare data with actual objects (picture, diagram, schematic or map)

13. Utilize information from an illustration to choose a course of action.

Other

14. Understand or interpret schematics with text in a foreign language.

15. Find information by skimming or scanning an entire illustration.

Tables

Locate

1. Locate the appropriate space in the table to enter data
2. Locate and extract information from a one-column list
3. Locate and extract information from a two-column table
4. Locate and extract information from an intersection of a row-by-column table

Copy

5. Transfer or enter information from another source onto a table

Generate

6. Write a description of an item (or enter information) into the appropriate section of a table

Integrate

7. Utilize information from the intersection of a complex table (i.e., a cell) to compare data within the table or chart.
8. Utilize information from the intersection of a complex table (i.e., a cell) to compare data with text, document materials or objects outside the table
9. Utilize information from tables to choose a course of action or solve a math problem
10. Use a key to locate and extract information from a table.

Other

11. Find information by skimming or scanning an entire table.

Graphs, Pie Charts, Bar Charts

Locate

1. Locate and extract information from a line graph

2. Locate and extract information from a pie chart

3. Locate and extract information from a bar chart

Copy

4. Transfer or enter information from another source onto a graph or pie or bar chart

Generate

5. Write a description of an item (or enter information) into the appropriate section of a graph or pie or bar chart

6. Plot data on a graph.

Integrate

7. Compare information in a graph or chart to other information internal to that graph or chart

8. Compare information on the graph or chart to information in an external source

9. Utilize information from graphs or pie or bar charts to choose a course of action or solve a math problem

10. Use a key to locate and interpret information in a graph or chart.

Prose

Reading

Locate

1. Match information in the task with information in the material

2. Underline or circle a portion of the text (e.g., a sentence)

Cycle

3. Find information by skimming or scanning text.

Integrate

4. Integrate or pull together (e.g., synthesize, summarize) two or more pieces of information located at different points in the text or reference source

5. Compare/contrast information in the text with information in an external source (a task or other source)

6. Determine a word's meaning from the context of a sentence or paragraph

7. Determine the main idea of a paragraph or several paragraphs

8. Read and understand the main idea of a job-specific material

9. Determine the main idea of a paragraph or several paragraphs which were written in non-standard English

Generate/Inference

9. Process information in the text but also go beyond that information by drawing on own knowledge or by making broad text-based inferences

10. Identify and also use appropriate sections of text and visual materials to complete a task

Reference Systems

1. Use alphabetic and alphanumeric filing system (e.g., locating files, filing information)

2. Find information by using a table of contents, index, appendix and glossary

3. Find appropriate section of a reference source (e.g., sentence, paragraph, heading, table) to answer a specific question

4. Find information by cross-referencing sources

5. Determine the main idea of a reference material (e.g., passages, letters, articles)

Vocabulary

1. Read and understand common words

2. Read and understand job-specific words

3. Read and understand the directions of east/west/north/south.

4. Read and understand abbreviations, contractions, and acronyms

5. Read and understand symbols and codes (e.g., colon, percent sign, w/, dollar sign)

6. Read, understand and use the concept of pH and the related range (0 to 14) and the concept of turbidity and the related range (0 to 5000+)

7. Read and understand standard chemistry abbreviations for elements and compounds (e.g., Cu, CO2).

Writing, Grammar, Editing, Spelling

1. Apply rules of grammar (e.g., verb/subject agreement, use of proper tense)
2. Recognize words needing capitalization
3. Apply rules for punctuation (e.g., commas, periods, apostrophes, semicolons)
4. Make wording changes to improve clarity
5. Spell common words correctly
6. Spell job-specific words correctly
7. Use references to check and correct spelling errors
8. Generate a written document (e.g., letter)
9. bc) (S) Adapt written communication to an audience's knowledge and needs
10. bc) (S) Identify in writing a "point of contact" for further information
11. bc) (S) Tailor written communication to achieve a particular purpose, in a process involving more than one person

Following Directions

1. Follow directions to complete a task that includes reading, identifying, observing and/or comparing

2. Follow very specific step-by-step directions to perform a sequence of tasks

3. Follow directions to complete a task which includes arithmetic operations and/or counting (e.g., shipping/receiving)

4. Follow directions to complete a task which involves entering information into a CRT screen

5. Follow directions to complete a task using a single illustration or a sequence of illustrations (pictures, diagrams, schematics, maps)

Identification (recognition)

1. Identify and label objects
2. Identify objects by particular physical characteristics (e.g., size, shape, color)
3. Select appropriate course of action by using taste, touch, sight or hearing

Computer-Related Skills

Locate

1. Locate and transfer (copy) data from a source (forms, gauges, scales) into a CRT screen

2. Locate information using a computer program

Integrate

3. Compare information using a computer program

Generate

4. Create or generate information using a computer program

Select

5. Determine which keyboard in a group of keyboards is of relevance to the problem.

Other

6. Understand the operation of a computer keyboard and/or mouse.

7. Read and respond to computer commands

8. Monitor computer screen for changes in data.

Synthesizing across Formats

1. Synthesize information from more than one source (e.g., written, pictorial, oral) to complete a task

Contingent Decision-Making/Analysis/Troubleshooting

1. Understand what information means and be able to induce or know, based on the information available, what happened or what went wrong.

2. Understand the sequence and cause/effect relation of the activities being monitored, e.g., the material flow, or how the slab comes from the caster.

3. Determine appropriate course of action in a particular situation (If, then)

4. Make decisions under time pressure.

5. bc) (S) Identify problem and report problem to appropriate person for further analysis

6. bc) (R) Investigate problem, if appropriate, and report on status

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Basic Communication: Working with other parties in the communication system to reach understanding

1. bc) (R) Address questions to an appropriate point of contact

2. bc) (R) Interpret information in light of who presented it (for example, assess credibility of information)

3. bc) (R) Recognize when identifying the specific author of a communication is necessary, and when it is not

4. bc) (R) Identify the relevant person to seek clarification or additional information from, when a specific "point of contact" is not named

Basic Communication: Adjusting to the limitations of materials

5. bc) (S) Provide information that may not be prompted for on a material, when considered important

6. bc) (S) Evaluate material as a tool for interaction

Basic Communication: Communicating about actions and procedures

7. bc) (S) Specify problems or the need for action, but do not specify the associated actions or procedures

8. bc) (R) Infer needed actions from written or orally communicated information

INFORMATION BRIEF

DEVELOPING A COMMON FRAMEWORK FOR THE SKILL STANDARDS SYSTEM: LEVELS, SCALES, AND EQUIVALENCIES

PREPARED BY
THE INSTITUTE FOR EDUCATIONAL LEADERSHIP
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Skill Levels and Equivalencies: *Related Projects and Issues**

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5/15/95

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LEVELS, SCALES, AND EQUIVALENCIES

This **Information Brief** is a part of a series of papers prepared under the auspices of the Center for Workforce Development's contract with the U.S. Department of Labor to help the pilot projects and the federal government address a range of issues that fall under the rubric of the "common framework." This is a background paper about issues that will need to be considered as the National Skill Standards Board (NSSB) develops its endorsement criteria and promotion materials to use standards as a common language between the various stakeholders. It provides no recommendations, or results of consensus building exercises among the pilot projects as is the case of a companion document addressing what a standard should look like and what it should contain.

Lessons from Australia form the beginnings of this paper. A presentation was made to all the pilot projects by a representative from Australia regarding the common framework used in that country for the development of skill standards and the lessons they are continuing to learn as their system unfolds. Three major points were emphasized; 1) the value of a common language to express the content of the standards; 2) the need to have an "equivalency factor" which translates the amount of education/training needed by an individual in order to be prepared for assessments; and 3) the indispensable value of having a hierarchy of levels that show progression of skill requirements from the novice to the master/management status. Establishing these three conditions were part of the Australian National Training Board's standard setting criteria for their industry lead bodies who have the responsibility for the actual skill standard development work. Using the language of the U.S. legislation this would translate into the types of things to be included in the endorsement criteria that must be developed.

The issue of scaling is included in the background material due to some of the research conducted by IEL for the pilot projects. As assessment instruments are developed it is necessary to establish either absolute cut-off pass or fail scores and/or establish a scale that places an individual's performance somewhere along a continuum of achievement. As we begin to look around at what approaches are used to address the "best" scaling techniques, we found there is no one best approach. Several methods are recognized by experts as being perfectly legitimate. However, this did raise yet another communication question. Should Partnership Bodies (PBs) be given some guidance about the issue of scaling assessment? And, if it is determined that such guidance is desirable then should the scaling fit into the decisions made by the NSSB about levels and education/training equivalencies?

What follows is a paper prepared by Dr. Judith Shaul Norbeck. It is essentially a literature review of an array of major initiatives undertaken in the U.S and two other countries which focus on how levels, scales, and equivalencies are addressed -- or not addressed. The review shows that scaling techniques are essentially technical but that some approaches may be more understandable to the layman than others. The review of types of levels used, in part, reflect the core purpose of the classification approach. Some focus on

academic proficiencies while others attempt to build a bridge between the workplace and schoolplace. The only attempt to address the equivalency issue can be found in the Levels used in the Dictionary of Occupational Titles, (now being replaced by O*NET). However, the term level in this case is not used in the same way that level is used in the examples of individual performance such as the Literacy Profiles.

This review shows, as is the case for many of the other tasks the NSSB must address, there is a base to build upon but that the very creation of the Board will finally fill in a missing link --- that is a designated body to make decisions and establish the common framework.

Joan L.Wills
Director, Center for Workforce Development

Introduction

Many different efforts relating to the teaching and evaluation of skills are currently taking place inside and outside the United States. There is no standard procedure that has been used in these projects regarding the issues of skill levels and equivalencies. Information about these projects is provided as background as the National Skill Standards Board deals with the task of developing a useful skills framework to cut across industries and to link industry and educational levels. In order to talk about common standards, it is expected that the Board will need to agree on how the domain of relevant skills should be established and how ratings and proficiency levels should be set.

For each of the efforts described, a common set of questions will be addressed:

1) *How was the domain identified*? That is, what is the domain of relevant skills for this project and how was it established?

2) *What was rated*? That is, was the focus on what jobs require? Was the focus on what schools require? Was the emphasis on a statistical approach that divides the distribution up into segments, representing different proficiency levels? Or was the emphasis on more than one of these?

3) *Are there proficiency levels? If so, how are they set?* That is, have varying levels of complexity or difficulty been identified? If so, what procedure was used to identify the levels?

It is important to note that there has been substantial discussion and debate within a number of these projects regarding how different types of behaviors are related to different proficiency levels.

4) *Who uses the standards, the levels and the scales, and for what purpose(s)?* That is, who applies the results of these projects—the standards, levels, and scales—and how are they applied?

There are several general and several more specific concerns that the Board will need to keep in mind as the members consider the establishment of common standards.

The general issues are validity and reliability. The validity question, of course, refers to whether there is evidence that one is measuring what one claims to measure. The reliability issue relates to consistency of measurement across industries, over time, and across judges. For example, is there consistency in the application of a standard regardless of the particular industry? Is there consistency across multiple administrations of assessments over time? Is there internal consistency among judges or assessors?

More specific concerns relating to the Board's task of establishing common standards relate to communication and to the creation of portable credentials.

One challenge the Board faces is communicating in as simple a way as possible across jobs, occupations, and industries. It may be helpful to communicate partly in terms of examples from real jobs. A common lexicon, understood by all relevant communities, would also be helpful. Another challenge is creating portable credentials—credentials that are roughly equivalent across industries and across levels of education. One central issue regarding the development of endorsement criteria is whether or not each industry group should be required to calibrate the levels and scales to one organizing theme that may cut across the current conceptual systems. If this should be required, then the organizing theme will need to be identified and explicitly defined. A second issue is whether equivalencies should be set as in Australia, by a negotiation among industry, government and education.

Three different types of projects in the U.S. will be described, and then the two most relevant international efforts will be discussed. First, two major conceptual systems, from the Secretary's Commission on Achieving Necessary Skills (SCANS) and from the *Dictionary of Occupational Titles*, will be described, along with projects relating to the validation and/or update of each conceptual system. Second, two groups of "aggregate temperature-taking tools," or assessments providing aggregate information about skill levels, will be described: the National Assessment of Educational Progress (NAEP); and three adult literacy assessments: the 1985 NAEP (*Literacy: Profiles of America's Young Adults*), the 1992 *Beyond the School Doors*, and the 1992 National Adult Literacy Survey (NALS). Third, a variety of private sector efforts, such as WorkKeys, the Initiative on Skills Enhancement for the Future/Job Literacy Analysis Research, and the New Standards Project, will be described. The efforts that took place in the United Kingdom and Australia will also be summarized, since both of these countries have dealt with the issue of establishing levels across industries and defining the link between industry levels and educational levels (i.e., equivalencies).

Project	How was the domain identified?
Secretary's Commission on Achieving Necessary Skills (SCANS) *Conducted by:* 30-member Commission appointed by Secretary of Labor *Funded by:* U.S. Department of Labor Status: Final report (*Learning a Living: A Blueprint for High Performance*) produced in 1992.	The domain to be identified was: the skills young people will need to be successful in the high-performance workplace of the future. The Commission identified five groupings of "workplace competencies" (SCANS, 1992, p. 6) and three groupings of "foundation skills." The categories and several examples of each are: **WORKPLACE COMPETENCIES:** 1. **Resources**: Knowing how to manage and allocate time, i.e., following schedules; prioritizing activities. 2. **Interpersonal Skills**: Actively participating as an effective team member; serving clients and customers in a way that meets their expectations. 3. **Information**: Maintaining necessary information in a systematic way; using computers to organize or analyze information. 4. **Systems**: Working effectively within systems of social, organizational or technological nature. 5. **Technology**: Selecting the machines and tools needed to produce a certain result; identifying and solving problems with those machines or tools. **FOUNDATION SKILLS:** 1. **Basic Skills**: Includes reading, writing, computing, listening, speaking and other skills (e.g., locating and understanding information in manuals, schedules and graphs). 2. **Thinking Skills**: Covers creative thinking, problem-solving, knowing how to learn, and other skills (e.g., recognizing that a problem exists and devising a plan to solve it). 3. **Personal Qualities**: Includes responsibility, self-esteem, honesty and other qualities (e.g., attending to details, concentrating well, accepting and working well on unpleasant tasks). In order to identify these competencies, the following procedure was followed: "a group of experts was invited to identify the major types of skills required to enter employment and the names of the skills that comprised each of these types" (SCANS Technical Report, 1992, p. 1-10) [the experts included representatives from industry, government, and education], a literature review was conducted to draft definitions of the skills, experts in each skill area provided feedback on the definitions, a job analysis of 15 jobs was conducted, some of the definitions were modified, and then a job analysis was done for an additional 35 jobs. The jobs represented "a wide variety of jobs thought to be in no danger of obsolescence" within five major sectors of the economy: "Health and Human Services; Office Financial Services, and Government; Accommodations and Personal Services; Manufacturing; Agri-Business, Mining and Construction; and Trade, Transportation and Communication" (Ibid., p. 1-12).

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What was rated?	Are there proficiency levels? If so, how are they set?			Who uses the standards, scales and levels and for what purpose?
The focus was on work-based standards, i.e., what was needed to be successful in various jobs of the future. However, the first SCANS report (*What Work Requires of Schools, 1991*), emphasized that schools should be incorporating the skills that jobs demand.	Part of the SCANS work included illustrating "various levels of difficulty for the. . . skills by identifying tasks that could serve as exemplars. This analysis included judgments about the difficulty of the task with respect to the specific skill. These judgments were collected from 20 persons who had fairly broad experience in professional or research positions relevant to occupational issues. These judgments were averaged to identify the tasks that could serve as exemplars for levels of skill difficulty. . . a high level of agreement was found for the judgments about the difficulty of the task in terms of SCANS skills" (SCANS Technical Report, 1992, p. 1-11). Examples of task descriptions for each skill were positioned along a continuum ranging from "higher" to "lower" in terms of difficulty. One example is given below for the Basic Skill of Reading:	**Higher End: Accounting/Financial Analyst:** "Reads government contracts to determine and locate financial information and possible areas of exposure—reviews the contract quickly to gain a general understanding of the content; reads the contract in a detailed manner, looking at each individual part carefully; highlights possible problem areas while reading the contract; compares highlighted areas from the contract to available financial data (client files, publications, books); makes conclusions as to the contractor's performance; and rereads highlighted areas from the contract to verify conclusions." (Ibid., p. 2-54). **Lower End: Order Filler:** "Reads a factory work order sheet for shipping instructions—obtains a package and factory work order; reads and the work order to obtain information on how to ship the package and the deadline for shipping, and ships the order in the prescribed manner." (Ibid., p. 2-55).	SCANS was and is used as a base to build on by other projects. In particular, the National Job Analysis Study (see below) was designed as a follow-up effort regarding SCANS with the purpose of helping to validate the skills described in the SCANS report. The SCANS skills are being and have been incorporated into school curriculum and assessments in several states.

Project	How was the domain was identified?
National Job Analysis Study (NJAS) *Conducted by:* American College Testing (ACT), Iowa City, IA *Funded by:* U.S. Departments of Labor and Education; Office of Personnel Management *Status:* In progress	The NJAS was undertaken in part as an effort to gather empirical evidence for the SCANS workforce competencies and skills prior to the building of an assessment for the skills. It was also undertaken to "empirically identify workplace behaviors common across numerous occupations and linked to employee success in high-performance organizations" (ACT, 1994d, p. i). A two-phase process is being used to gather the information. The panel of experts guiding the process includes representatives from industry, labor, professional associations, education and government. The goals of the study are to: 1. Design a blueprint for use in developing content-valid tests. 2. Set proficiency levels for the behaviors based partly on the need for the behaviors and time spent on the job (e.g., behaviors needed at entry versus after one year on the job). 3. Design tentative models for the interrelationships between and among the behaviors identified. The first phase of the process involved the distribution of a survey including two types of task statements. The first type were behavior statements designed to illustrate the SCANS skills. The second were statements based on an analysis by ACT staff of a variety of occupational databases such as the *Dictionary of Occupational Titles* and the database of the Office of Personnel Management. Common task statements were constructed based on specific criteria such as similarity of verbs or similarity of verb objects. One part of the two-part survey was then distributed to 12,000 job incumbents in 6,000 organizations, representing about 164 occupations. Survey respondents were asked to rate each behavior in terms of frequency and importance. Examples of behaviors that were rated were: "Prepare budgets for workplace expenses; Enter information or data into computer files" (Ibid., p. 2-17). Analysis of the survey results will include determining an overall rating of criticality for each behavior (that is, the product of the frequency score and the importance score), and establishing cut scores based on criticality means and standard deviations. After the initial cut scores are determined statistically, a panel of experts will review the cut scores and agree together on the final cut scores. Phase two of the NJAS will involve verifying the common behaviors identified in Phase one, linking the behaviors to high performance organizations, and establishing the relationship between the behaviors and "job tenure," or when the behavior is needed on the job, e.g., at entry; after six months. An "Environmental Survey" will be conducted along with the second job analysis survey. This survey will help determine the characteristics of a high-performance organization. It will be based on 36 suggested characteristics resulting from a literature review, feedback from trade associations, interviews with individuals working in high performance organizations, and a panel of experts. Examples of the 36 characteristics include "employee participation in decisions, self-directed teams, focus on quality, emphasis on problem solving" (ACT, 1994e, p. 23). The 36 characteristics were included in a pilot survey sent to the management and executive personnel of 44 companies.

	What was rated?	Are the proficiency levels? If so, how are the set?		Who uses the standards, scales and levels and for what purpose?
Analysis of data from the second phase job analysis will include cluster analysis to sort the behaviors into similar dimensions (a panel of experts will make the final decision regarding the sorting), factor analysis to help establish the models to account for the relationship between the behaviors and the dimensions, and multivariate analysis of variance on the Environmental Survey to determine the relationship of the common behaviors to the type of workplace. A panel of experts will determine the cut scores of the common behaviors using the same procedure as in Phase one.	The focus was on work-based standards or what occupations (in particular, what high performance occupations) require.	In designing the blueprint for use in developing future assessments, proficiency levels will be set. The procedure to be used is as follows: "Data analysis will provide the initial step in rank-ordering the core set of behaviors according to when they are needed on the jobs sampled (e.g., at entry, after 6 months, after 1 year). The core cross-occupational behaviors, ranked on a continuum from entry to 1 year and beyond, will be scaled along relevant dimensions using a format such as the Behaviorally Anchored Rating Scales (BARS) developed by Smith and Kendall (1968). The scales will be developed from core behaviors in each dimension, the relationships among all of the core behaviors, job tenure information, and input from the panel of experts. Once the behaviors are scaled hierarchically, the panel will establish proficiency levels.	Subject matter experts will then identify the knowledge, skills, abilities (KSA's) associated with the behaviors for each proficiency level. Instrumentation will be developed and administered to ensure that the level assignments and KSA's are reliable and valid." (ACT, 1994d, p. 2-26). An example of proficiency levels for one behavioral area, "Informs clients and customer," is: "**Level 4**: Compares and contrasts products or services provided by own vendor and outside vendors. **Level 3**: Informs customer about features/ operations of a product/ service. **Level 2**: Matches customer needs to a specific product or service. **Level 1**: Directs customer to location of a product or service." (Ibid., p. 2-27).	As noted earlier, the NJAS is in progress. The results are expected to be used in the development of assessments. The information could also be used in the development of educational curriculum to help students prepare for the world of work, and in helping workers transition from one job to another.

Project	How was the domain was identified?	What was rated?		Are there proficiency levels? If so, how are they set?
Dictionary of Occupational Titles (DOT) *Conducted by:* U.S. Employment Service *Funded by:* U.S. Department of Labor *Status:* First edition published in 1939; most current update published in 1993.	The DOT was developed "in response to the demand of an expanding public employment service for standardized occupational information to support job placement activities.., employment counseling, occupational and career guidance, and labor market information services" (DOT, 1991, p. xv). The first edition described about 17,500 jobs in uniform occupational language. The current edition and supplement include "some 12,000 job definitions" (APDOT, 1993, p. 4).	The focus was on work-based standards, i.e., information was gathered by occupational analysts regarding what the jobs required. The DOT supplies ratings for on-the-job characteristics (Data, People, and Things) for each of the jobs described as well as information on aptitude, temperament, interest factors, physical demands, and working conditions. Particularly relevant to this paper are the measures of training, GED (General Educational Development) and SVP (Specific Vocational Preparation). GED reflect "those aspects of education (formal and informal) which are required of the worker for satisfactory job performance" (DOT, 1991, p. 1009). SVP is defined as "the amount of lapsed time required by a typical worker to learn the techniques, acquire the information, and develop the facility needed for average performance in a specific job-worker situation" (DOT, 1993, p. B-1). Specific vocational training includes vocational education, apprenticeship training, in-plant training, on-the-job training, and related and necessary experience in other jobs.	Proficiency levels were set for the Specific Vocational Training. The nine levels of SVP are: (Ibid., p. B-1): **Level 1**: Short demonstration only **Level 2**: Anything beyond short demonstration up to and including 1 month **Level 3**: Over 1 month up to and including 3 months **Level 4**: Over 3 months up to and including 6 months **Level 5**: Over 6 months up to and including 1 year **Level 6**: Over 1 year up to and including 2 years **Level 7**: Over 2 years up to and including 4 years **Level 8**: Over 4 years up to and including 10 years **Level 9**: Over 10 years.

		Who uses the standards, scales and levels and for what purpose?
The calculation of the proficiency levels were done by analysts according to the following guidelines: "The level of SVP presented in the scale are mutually exclusive and do not overlap. Time that applies to General Educational Development is not considered in estimating Specific Vocational Preparation. Analysts consider employer's requirements as well as similar jobs when they estimate an SVP level for a job, i.e., they do not restrict their rating to only the employer's stated vocational preparation requirements. When calculating SVP, analysts usually count the average four-year college curriculum as equivalent to two years of specific vocational preparation and each year of graduate school as a year of specific vocational preparation. If necessary, analysts may calculate two	classroom hours of secondary school vocational education, as an hour of SVP. However, at the post-secondary level of vocational education, they count each classroom hour as an hour of SVP." (Ibid., p. B-2).	The DOT information is utilized by a variety of users for a variety of purposes. For example, human resource professionals use the DOT to create or change job classifications, to determine the qualifications for selection tests and for competency certification. Department of Labor officials use the DOT in training, retraining and placement programs, and the Social Security Administration uses it as one source of data regarding the determination of disability benefits. The DOT has also been used for guidance and counseling by employment and career counselors.

Project	How was the domain identified?			What was rated?
The New Dictionary of Occupational Titles: *A Database of Occupational Titles for the Twenty-First Century* *Conducted by:* Advisory Panel for the Dictionary of Occupational Titles (APDOT), a panel commissioned by the Secretary of Labor *Funded by:* U.S. Department of Labor, Employment and Training Administration *Status:* The final report was issued in 1993.	The domain of occupations is similar to that of the DOT, since the APDOT report included suggested new content for the revised DOT and recommended strategies for collecting and disseminating occupational information. APDOT recommended that a single standardized occupational classification be developed which would be useful in schools, training agencies and the workplace by educators, employers or workers - i.e., anyone using occupational information. The Advisory Panel recommended a Content Model as the framework suggested for use in the revision of the DOT. With regard to skills, the Model identifies six different areas of "worker attributes," each described below with an example. The areas range on a continuum from general to more specific. 1. **Aptitudes and Abilities** - The capacity to perform groups or types of mental and physical functions (e.g., cognitive abilities - eye-hand coordination). 2. **Workplace Basic Skills** - Abilities that are necessary in almost every job (e.g., reading, writing, computing). 3. **Cross-Functional Skills** - Generic skills that are necessary in broad groups of jobs (e.g., information gathering, problem analysis). 4. **Occupation-Specific Skills** - The ability to perform work activities unique to narrow ranges of jobs (e.g., ability to read blueprints, ability to operate a milling machine). 5. **Occupation-Specific Knowledge** - Familiarity with the Content of a Specific Subject area or discipline (e.g., COBOL, Spanish, financial planning and analysis). 6. **Personal Qualities** - A person's usual way of acting with regard to oneself and others (e.g., responsibility).	The focus was on work-based standards. The Content Model was based on an analysis of survey results, public comments, and the research literature as it relate to job analysis, skills analysis, organizational analysis and individual differences.

Are there proficiency levels? If so, how are they set?	Who uses the standards, scales and levels and for what purpose?
APDOT did not set proficiency levels.	The APDOT Content Model is being used by the Department of Labor to guide the development of the revision of the DOT. It has served as a cornerstone in the DOT Prototype Project/O*NET (see below).

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Project	How was the domain identified?			What was rated?
The DOT Prototype Project/O*NET *Conducted by:* American Institutes for Research, Washington, DC; and Personnel Decisions Research Institutes, Inc.; Management Research Institute; Jeanneret & Associates, Inc.; Westat, Inc.; and Policy Studies Associates, Inc. *Funded by:* Employment and Training Administration, U.S. Department of Labor *Status:* In Progress	The starting point for the DOT Prototype Project/O*NET was the APDOT Content Model. O*NET is the Occupational Information Network, the automated replacement for the DOT. O*NET will include detailed information about present and future jobs and the skills and abilities of the labor force. As part of the DOT Prototype Project, AIR is working to develop a common language for all users of occupational information. Currently, in O*NET there are expected to be "cross-job descriptors" and "occupation-specific descriptors." Cross-job descriptors are elements of all jobs, throughout the economy. They are expected to include both attributes of the people who do the work and attributes of the work itself. The person attributes would include "person requirements" and "person characteristics." Examples of person requirements include basic skills, cross-functional skills (developed capacities that facilitate performance across jobs), and education level. Examples of person attributes are personality and interests. The work attributes are expected to include "experience requirements, occupational requirements, and occupational characteristics." Experience requirements encompass training, licensure, and work-related experience. Occupational requirements are the tasks that make up the job and the conditions in which they are performed. Occupational characteristics include pay rate and availability of job opportunities. Occupation-specific descriptors will be included in the DOT prototype as well as cross-job descriptors. Occupation-specific descriptors are elements of selected or specific occupations. The domain of descriptors to be included in the general survey has been identified through a literature review. Examples of the descriptors include: under person attributes/interests: achievement-Workers on this job get a feeling of accomplishment; status-Workers on this job have opportunities for advancement; and under person requirements: basic skills: monitoring-Assessing how well one is doing and changing approach to improve performance; writing-Communicating with others in writing. A pilot test was done for the survey instrument, which will be distributed in the near future to people in 80 occupations. The respondents will be asked to rate the descriptors in terms of the importance (or impact on overall task performance) and complexity of demands (or level of performance needed). A matrix sampling plan will be used to distribute the survey so that 33 job incumbents will be sent questions on each descriptor.	The focus is on work-based standards, or the identification of what jobs require.

Are there proficiency levels? If so, how are they set?	Who uses the standards, scales and levels and for what purpose?
To date, no proficiency levels have been established in the DOT Prototype Project. The levels expected to be established in the DOT Prototype Project will include incumbents' ratings of importance and level of performance. Importance, as noted earlier, refers to the impact a descriptor or element has on overall task performance. This is expected to be rated on a 5-point scale. Level of performance is the indication, tentatively on a 7-point behaviorally anchored scale, of the level of the skill an incumbent needs to perform in his or her occupation. There may also be a question included regarding whether the level of skill is required for entry to the job. The scales are currently in the process of revision.	An operational prototype of O*NET is expected in the spring of 1996. The expected users of the O*NET system include businesses, workers, educators and policy makers. Employers are expected to use O*NET to help select, train and place workers in jobs; educators are expected to use the information to prepare students to meet the challenges of the workplace of the future, and workers are expected to use it to identify the skills necessary to attain their career and employment goals.

Project	How was the domain identified?	What was rated?	Are there proficiency levels? If so, how are they set?	
The Nation's Report Card: The National Assessment of Educational Progress (NAEP) *Conducted by:* Educational Testing Service, Princeton, NJ *Funded by:* National Center for Education Statistics, Office of Educational Research and Improvement, U.S. Department of Education *Status:* Surveys conducted from 1969 through 1990 were summarized in 1992's *Trends in Academic Progress*. Additional assessments are ongoing and are expected to continue in the future.	The domain assessed includes various subject areas, such as science, math, reading, and writing, for the 4th, 8th and 12th grade.	NAEP has focused on subject matter or school-based standards, i.e., what schools require. Achievement levels of 9-year-olds, 13-year-olds, and 17-year-olds have been assessed in a number of academic areas, including science, math, reading and writing.	Proficiency levels were set in 1990 and then re-established in 1992. The resulting basic, proficient, and advanced levels (by grades 4, 8, and 12) have been applied to assessments conducted since then. The procedure used to identify the levels consisted of 1) assembling a broadly-constituted expert panel of judges including teachers, principals, and lay people; 2) asking the experts to judge, for each grade-specific item pool, whether people at the basic (or proficient or advanced) level should get the item right; and 3) using a judgmental method to establish cut scores for each grade level. The result of the procedure was: operationalized definitions of the three levels for each of the three grade levels, scale scores that defined the lower bound of each proficiency level, and a set of exemplar exercises for each level.	The policy-based definitions for each of the three achievement levels were as follows: **Basic**- *This level, below proficient, denotes partial mastery of knowledge and skills that are fundamental for proficient work at each grade—4, 8, and 12.* For twelfth grade, this is higher than minimum competency skills (which normally are taught in elementary and junior high schools) and covers significant elements of standard high-school-level work. **Proficient**- *This central level represents solid academic performance for each grade tested—4, 8, and 12. It reflects a consensus that students reaching this level have demonstrated competency over challenging subject matter and are well prepared for the next level of schooling.* At grade 12, the proficient level encompasses a body of subject-matter knowledge and analytical skills, of

cultural literacy and insight, that all high school graduates should have for democratic citizenship, responsible adulthood, and productive work.

Advanced- *This higher level signifies superior performance beyond proficient grade-level mastery at grade 4, 8, and 12.* For twelfth grade, the advanced level shows readiness for rigorous college courses, advanced technical training, or employment requiring advanced academic achievement. As data become available, it may be based in part on international comparisons of academic achievement and may also be related to Advanced Placement and other college placement exams." (Ibid., p. 38).

Examples of the operationalized definitions for mathematics are shown below*:

FOR FOURTH GRADE:

Basic:- "Fourth grade students performing at the basic level should show some evidence of understanding the mathematical concepts and procedures in the five NAEP content areas" (Ibid., p. 40).

Proficient: - "Fourth grade students performing at the proficient level should consistently apply integrated procedural knowledge and conceptual understanding to problem solving in the five NAEP content areas" (Ibid., p. 40).

Advanced: - "Fourth grade students performing at the advanced level should apply integrated procedural knowledge and conceptual understanding to problem solving in the five NAEP content areas" (Ibid., p. 41).

FOR EIGHTH GRADE:

Basic:- "Eighth grade students performing at the basic level should exhibit evidence of conceptual and procedural understanding in the five NAEP content areas. This level of performance signifies an understanding of arithmetic operations—including estimation—on whole numbers, decimals, fractions, and percents" (Ibid., p. 42).

Proficient: - "Eighth grade students performing at the proficient level should apply mathematical concepts and procedures consistently to complex problems in the five NAEP content areas" (Ibid., p. 42).

Advanced: - "Eighth grade students performing at the advanced level should be able to reach beyond the recognition, identification, and application of mathematical rules in order to generalize and synthesize concepts and principles in the five NAEP content areas" (Ibid., p. 43).

FOR TWELFTH GRADE:

Basic: - "Twelfth grade students performing at the basic level should demonstrate procedural and conceptual knowledge in solving problems in the five NAEP content areas" (Ibid., p. 44).

Proficient: - "Twelfth grade students performing at the proficient level should consistently integrate mathematical concepts and procedures to the solutions of more complex problems in the five NAEP content area" (Ibid., p. 44).

Advanced: - "Twelfth grade students performing at the advanced level should consistently demonstrate the integration of procedural and conceptual knowledge and the synthesis of ideas in the five NAEP content areas" (Ibid., p. 45).

*The five NAEP content areas in mathematics are (1) numbers and operations, (2) measurement, (3) geometry, (4) data analysis, statistics and probability, and (5) algebra and functions (Phillips, Mullis et al., 1993, p. 40).

Who uses the standards, scales and levels and for what purpose?

NAEP is an "aggregate temperature-taking tool," i.e., it provides group data, not individual data, about skill levels in the various subject areas. The information has been used by policy makers and educators in determining trends in achievement in the subject areas.

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Project	How was the domain identified?		What was rated?	
THREE ADULT LITERACY ASSESSMENTS: **A. NAEP: Literacy: Profiles of America's Young Adults (1985)** **B. Beyond the School Doors:** *The Literacy Needs of Job Seekers Served by the U.S. Department of Labor (1992)* **C. Adult Literacy in America:** *A First Look at the Results of the National Adult Literacy Survey (1992 NALS).* *Conducted by:* Educational Testing Service, Princeton, NJ *Funded by:* A) 1985 NAEP Young Adult Survey: Office for Educational Research and Improvement, U.S. Department of Education B) 1992 *Beyond the School Doors*, Employment and Training Administration, U.S. Department of Labor C) 1992 NALS: National Center for Educational Statistics, U.S. Department of Education	These three paper-and-pencil surveys included a wide variety of tasks designed to measure "literacy," which was defined by a panel of experts in the first study to be "using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential" (ETS, 1986, p. 3). Literacy was viewed "not as a single dimension along which a single cut-point or standard can be selected. . . but in terms of three scales" (ETS, 1992, p. 6): ■ Prose literacy, or the skills and knowledge necessary to understand and utilize information from prose materials such as newspaper articles, magazines, and books. ■ Document literacy, or the skills and knowledge necessary to identify and utilize information included in tables, charts, forms, or indexes. ■ Quantitative literacy, or the skills and knowledge needed to apply arithmetic operations to information in printed form, for example, order forms, menus, or advertisements.	The focus of these three surveys was on theoretical and measurement-based standards. In the 1985 NAEP, "The tasks selected to typify performance at any specified point on a scale distinguished among individuals who, at the proficiency level, have a high probability of success on those tasks as compared with individuals estimated to be at lower levels on the scale. In this assessment, the criterion for success was 80 percent probability. This means that individuals estimated to be at a given level on the scale consistently—that is, with 80 percent probability—perform tasks like those used to illustrate performance at that level. Individuals at lower levels on the scale also have a chance of successfully performing the more difficult tasks, but their probability of success is considerably lower than 80 percent and, thus, one has much less confidence that they will perform the more difficult tasks consistently. As a result, they are not estimated to be performing at the higher level(s) even though they occasionally succeed on more difficult tasks" (ETS, 1986, p. 10). In the 1992 *Beyond the School Doors* and the 1992 NALS, the Prose, Document, and Quantitative (PDQ) scales were expressed in terms of five proficiency levels. These levels "were determined not as a result of any statistical property of the scales, but rather as a result of shifts in the skills and strategies required to succeed on various task along the scales, from simple to complex" (Kirsch, Jungeblut, Jenkins & Kolstad, 1993, p. 73).

Are there proficiency levels? If so, how are they set?

No levels were created for the 1985 NAEP; instead, tasks were used as noted above.

Beyond the School Doors and NALS results were expressed in five proficiency levels. The difficulty levels of a particular task were determined by a set of different characteristics for each of the three scales. For example, the quantitative literacy levels were determined by:

- "the particular arithmetic operation called for;
- the number of operations need to perform the task;
- the extent to which the numbers are embedded in printed materials; and,
- the extent to which an inferences must be made to identify the type of operation to perform" (ETS, 1992, p. 50).

For *Beyond the School Doors*, a coding scheme for Prose, Document and Quantitative literacy, reflected by the example given above for Quantitative literacy, was used to develop new tasks. These "process variables" were used to assign a code to each item. Regression analyses designed to predict the scale values of each task were then done. The analyses were interpreted as lending overall support that the variables used in the coding were significant.

It was noted that as the tasks increased in difficulty level, so did the code values, in a "quite systematic" fashion. Visual inspection of the distribution of the task codes revealed the shift in the skill or process requirements referred to above. These shifts occurred at roughly 50-point intervals. Once these five proficiency levels were identified using this process, regression analyses were done using the proficiency levels instead of the individual task values as dependent variable. The analyses provided evidence of internal consistency.

NALS results were so similar to *Beyond the School Door* results that it was decided that use of the same five proficiency levels was appropriate.

There has been significant discussion regarding the exact process used to set the proficiency levels for NALS; one of the reports describing the process is currently still in working draft form.

The ranges of the five level are as follows: Level 1: less than 225, Level 2: 226 to 275, Level 3: 276 to 325, Level 4: 326 to 375, Level 5: 376 and higher. An example of the description of Prose Levels 2 and 4, Document Levels 2 and 4, and Quantitative Levels 2 and 4 appear below.

- **Level 2 Prose**: "Some tasks in this level require readers to locate a single piece of information in the text; however, several distractors or plausible but incorrect pieces of information may be present, or low-level inferences may be required. Other tasks require the reader to integrate two or more pieces of information or to compare and contrast easily identifiable information based on a criterion provided in the question or directive" (Kirsch, Jungeblut, Jenkins & Kolstad, 1993, p. 73).
- **Level 2 Document**: "Tasks in this level are more varied than those in Level 1. Some require the readers to match a single piece of information; however, several distractors may be present, or the match may require low-level inferences. Tasks in this level may also ask the reader to cycle through information in a document or to integrate information from various parts of a document" (Ibid., p. 11).
- **Level 2 Quantitative**: "Tasks in this level typically require readers to perform a single operation using numbers that are either stated in the task or easily located in the material. The operation to be performed may be stated in the question or easily determined from the format of the material (for example, an order form)" (Ibid., p. 11).
- **Level 4 Prose**: "These tasks require readers to perform multiple-feature matches and to integrate or synthesize information from complex or lengthy passages. More complex inferences are needed to perform successfully. Conditional information is frequently present in tasks at this level and must be taken into consideration by the

reader" (Kirsch, Jungeblut, Jenkins & Kolstad, 1993, p. 11).

- **Level 4 Document**: "Tasks in this level, like those at the previous, levels, ask readers to perform multiple-feature matches, cycle through documents, and integrate information; however, they require a greater degree of inferencing. Many of these tasks require readers to provide numerous responses but do not designate how many responses are needed. Conditional information is also present in the document tasks at this level and must be taken into account by the reader" (Ibid., p. 11).
- **Level 4 Quantitative**: "these tasks tend to require readers to perform two or more sequential operations or

a single operation in which the quantities are found in different types of displays, or the operations must be inferred from semantic information given or dawn from prior knowledge" (Ibid., p. 11).

The 1985 NAEP, 1992 *Beyond the School Doors* and 1992 NALS were all "aggregate temperature-taking tools," i.e., assessments that provided group data about literacy skill levels. The results have been used by policy makers and educators in determining levels of literacy skills across a broad range of adults.

The 1992 assessments have also been converted into individual assessments: the Workplace Literacy Test and the Test of Applied Literacy Skills.

Project	How was the domain identified?		What was rated?	Are there proficiency levels? If so, how are they set?
WorkKeys™ *Conducted by:* American College Testing Program, Iowa City, IA *Funded by:* American College Testing Program, Iowa City, IA *Status:* The product became available in 1993.	The WorkKeys system is designed to measure generic workplace skills. Assessments are currently available for the areas of Applied Mathematics and Applied Technology (under the category of Problem-Solving Skills), the areas of Reading for Information, Writing, Listening, and Locating Information (under Communication Skills), and the area of Teamwork (under Interpersonal Skills). Future assessments may include the areas of Observation and Work Habits. In developing WorkKeys, ACT worked with representatives from 150 small, medium, and large businesses across the U.S. The WorkKeys National Network currently includes seven charter states, seven state Offices of Education, and five educational associations: the American Association for Adult and Continuing Education, the American Association of Community Colleges, the Community College System of California, the National Association of Secondary School Principals, and the National Association of State Directors of Vocational and Technical Education Consortium. In order to develop the assessments, jobs were profiled by ACT-certified Job Analysts. The Job Analysts generated a list of tasks by using as a starting point the tasks from the DOT. Then incumbent workers and/or supervisors reviewed the list and rated the tasks' importance and the time spent on each. Importance and time spent ratings were used to calculate criticality. Workers and/or supervisors also identified the skill(s) and level of skill needed for each task and for the job.	The focus was work-based, i.e., it was based on the analysis of what jobs require. "Job profiling" refers to the determination of the skills the job requires and is one of the three uses for the system. A second use is the assessment of individuals' levels of skills. A third use is the relating of the job skill level requirements to the individual's skill levels and "targets for instruction," or information regarding the skills individuals need to acquire to perform the jobs they would like to have.	The assessments do have proficiency levels. Each assessment includes four or five levels of complexity, ranging from a level 3, the lowest level that employers feel is valuable, to a level 6 or 7, which represents the highest level employers expect of the incumbents without additional job-specific training. As mentioned earlier, workers and/or supervisors help to identify the level of skill needed for each task and each job. The specific procedure for setting the proficiency levels is as follows: A literature review is done to identify the relevant skill areas. For each skill, educators and industry representatives are brought together as an Advisory Panel. The panel develops the test specifications, which are then used to construct the assessment. For the lowest proficiency level, the Panel identifies the minimum level of skill a person must have to be hired, i.e., without

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	Who uses the standards, scales and levels and for what purpose?
level of skill, the employer would not hire him or her. For the highest proficiency level, the Panel identifies the highest amount of the skill that a person might need, assuming that the skill must be learned from general information instead of job-specific training. An attempt is made to set reasonable steps in proficiency levels and to base the levels on logical divisions and on variations in complexity.	WorkKeys is currently being used by high schools in about 20 states as part of career development and guidance programs. Smaller user groups currently include community colleges, manufacturing and technical businesses, and proprietary schools.

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Project	How was the domain identified?

The Initiative on Skills Enhancement for the Future and other Job Literacy Analysis Research

Conducted by:

Center for Skills Enhancement, Princeton, NJ

Funded by:

The Initiative is funded by the Institute for Career Development, (a steel industry joint Labor-Management Program*) Merrillville, IN

Status:

Ongoing research. The Initiative was completed at one steel company in the spring of 1995. The following expectation is a gradual expansion of the Initiative to become a steel industry-wide project.

*ICD represents 76,000 United Steelworkers of America and 13 steel companies.

The process of Job Literacy Analysis (Norback et al., 1990, 1991, 1994) has been applied to 29 job groupings in the Initiative and prior work to identify the basic skills needed in the job groupings now and in the future. Literacy is defined as "any material-driven process; a material consists of printed matter or objects with words or numbers on them, such as gauges or control panels." (Norback & Forehand, 1995).

Materials used for real tasks in real jobs are examined. Results are reported in terms of the materials used on the job, the tasks performed with the materials, and the skills required to perform the tasks. Job incumbents identify and provide examples of the most important materials that they use on the job, describe how they use the materials, and rate the importance and frequency of use of the materials on their job. Researchers infer the required literacy skills from the materials and task descriptions.

An Advisory Committee of supervisors reviews the results to see if any important material, task, or skill has been omitted. The JLA results in a list of the basic skills required for the job, a list of the most important materials and related tasks, and a list of the tasks and materials organized by skill.

To data, 29 job groupings, in at least four occupational clusters and across 44 different settings, have been analyzed. As a result, a total of 171 basic skills in 25 categories of basic skills have been identified. "Quantitative, Document, and Prose are categories previously used to describe the skills of general adult literacy (ETS, 1991). The remaining categories were needed to account for the full range of material-driven processes observed." (Norback & Forehand, 1995). The 25 categories are:

Quantitative

1. Formulate
2. Add and/or Subtract
3. Multiply and/or Divide
4. Other Arithmetic Processes
5. Numbers and Counting
6. Telling Time
7. Linear, Weight and Volume Measures
8. Scales and other Gauge Measures

Document

9. Select
10. Process Forms
11. Process Illustrations
12. Process Tables
13. Process Graphs, Pie Charts, Bar Charts

Prose

14. Reading
15. Reference
16. Vocabulary
17. Grammar, Editing, Spelling

18. Identification
19. Computer-Related Skills
20. Following Directions
21. Synthesizing
22. Contingent Decision-Making/Analysis/ Troubleshooting
23. Writing
24. Geometry

(Norback, 1995).

Of the 140 skills identified prior to the Initiative**, 46 percent were exact matches with general adult literacy skills (as defined in the Prose, Document, and Quantitative framework), 27 percent were similar to general adult literacy skills, and 26 percent were newly-identified. The newly-identified skills included all of the skills in the nine following categories: Linear, Weight and Volume Measures; Scales and other Gauge Measures; Selecting; Reference; Identification; Computer-Related Skills; Following Directions; Synthesizing; and Contingent Decision-

**During the Initiative, 28 skills were newly-identified and several skills were edited and rewritten into multiple skills.

What was rated?	Are there proficiency levels? If so, how are the set?		Who uses the standards, scales and levels and for what purpose?
Making. Part of the skills in the Reading category were also newly-identified (Norback & Forehand, 1995). In the Initiative, or the most current 10 Job Literacy Analyses, common basic skills across the 10 analyses are currently being identified.	The focus is on work-based standards, i.e., the identification of the basic skills the job groupings require. Basic skills common to multiple job groupings are currently under analysis.	Proficiency levels do not currently result from Job Literacy Analysis. Research currently underway is focusing on what makes the literacy required by a job complex. To date six potential complexity measures have been studied in four job groupings. The measures are: number of skills, number of skill categories, number of categories of materials, average number of tasks per category of materials, total number of material-related tasks, and number of structures* within materials. The preliminary work completed indicates that the fifth variable (a composite of the third and fourth) appears the	most promising in differentiating among jobs in terms of literacy demands. (Norback & Forehand, 1995).	The reports resulting from Job Literacy Analyses in the Initiative are being used by ICD and one steel company to build customized training. Additional companies are currently interested in participating in this work, which is now expanding. The results are expected to be used by the Local Joint Committees in the steel industry in a number of other ways, e.g., as a basis for recommending various courses, and for self-study by workers.

*"A structure is a format used to organize information in a particular document. Kirsch and Mosenthal (1989 to 1991) identified. . . different kinds of structures, including graphs, charts, diagrams, and prose. . ." (Norback & Forehand, 1995).

Project	How was the domain identified?			What was rated?
The New Standards Project *Conducted by:* Learning Research and Development Center, University of Pittsburgh and National Center on Education and the Economy in Rochester, NY Funded by: The Pew Charitable Trusts and the John D. and Catherine T. MacArthur Foundation, the partners (as of February 1995, 17 states and six large school districts), and the federal government. *Status:* Started in 1991; in progress.	The New Standards Project is focusing on four subject areas: English language arts, math, science, and Applied Learning. Additional content areas may be added in the future. The first performance assessments and exams are expected to be available for use in the near future. The first goal of the development of the preliminary Applied Learning framework is "to identify the foundations on which generic workplace competencies can be built and to bring those foundations into the schools as authentic performance standards. The second main goal is to build an approach to assessment that is as authentic as possible." (Norback, Lesgold, Katz & Eggan, 1995). The New Standards Applied Learning framework includes nine skills strands, which are believed to be critical for effective performance in the workplace of today and of the future. The skill strands "are generic applied learning abilities and include competency descriptions borrowed from the Australian Key Competencies (AEC, MOVEET, 1992). And some were derived from the work of the SCANS Commission" (Ibid.). The nine strands are: 1. Collecting, analyzing and organizing information 2. Communicating ideas and information 3. Planning and organizing resources 4. Working with others and in teams 5. Using mathematical ideas and techniques 6. Solving problems 7. Using technology 8. Understanding and designing systems 9. Learning and teaching on demand.	Another part of the framework categorizes "contexts of use," which reflect real-world tasks, jobs, and situations. Contexts of use include five tentative dimensions: 1) source of the task (for example, is it self-initiated?), 2) type of product or outcome, 3) audience for whom the work is being done, 4) work organization (for example, is it an individual project?), and 5) location of work (for example, is it within or outside the company or school?).	New Standards is focusing on subject-matter or school-based standards as well as work-based standards. The standards and the performance assessments and exams are being designed to reflect what schools require, while there is also an emphasis on reflecting what jobs demand through the work on Applied Learning.

Are there proficiency levels? If so, how are they set?	Who uses the standards, scales and levels and for what purpose?
Work is currently focusing on finalizing the standards for each of the subject areas. The draft form of the standards is about 150 pages long and includes exemplar tasks. The tasks are examples of actual student work which is annotated, with comments indicating which part of the work reflects what part of the standard.	As of February 1995, 17 states and six large school districts "that collectively enroll about half of the school children in the U.S." (Ibid.) were voluntary partners with LRDC and NCEE in the New Standards Project.

Project	How was the domain identified?			What was rated?
The United Kingdom Standards *Status:* Work on the standards system started in the early 1980's, with the National Council for Vocational Qualifications being established in 1986.	The standards, i.e., "competencies," or National Vocational Qualifications (NVQs) are based on employment functions across industries. The competencies incorporate specified standards in "the ability to perform in a range of work related activities; and, the underpinning skills, knowledge and understanding required for performance in employment. . . Employers and employees in the relevant industrial sector, occupation or profession" were consulted regarding what jobs required (Ibid., p. 54). To ensure the use of common language, since the assessments are primarily work-based, the National Council for Vocational Qualifications (NCVQ), which consists of representatives from industry, education, professional associations, and labor, specifies how to write a competency. Each competency must have a Title (e.g., "Financial Services"), and Units	(e.g., "Set up, monitor and maintain customer accounts.") (Ibid., p. 56). Each one must also have Elements of Competence and Performance Criteria. The former are descriptions of functions clearly related to work which will facilitate an individual's entry into and progression up the career path. Elements include technical requirements of the work as well as "softer" skills such as teamwork and problem-solving. Each element is required to have an action verb, an object and a condition. An example of an Element is: "Set up new customer accounts." Performance criteria, i.e., criteria meant to be used by an assessor to determine proficiency, describe the ability to perform in a range of activities required for employment and the skills and knowledge necessary for the ability. These Criteria are required to include a critical outcome (i.e., an action for the function described in the Element)	and an evaluative statement that is either quantitative or qualitative. An example of a Criterion is: "Internal/external documents are complete, accurate, legible, and delivered to the next stage in the process schedule" (Ibid., p. 56). Finally, competencies must have a Range Statement describing the contexts or situations in which the competence must be applied, e.g., "Customer accounts in investment and lending."	The focus was on work-based competencies, i.e., identifying what occupations require. As described earlier, employers and employees provided this information.

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Are there proficiency levels? If so, how are they set?			Who uses the standards, scales and levels and for what purpose?
Within this framework, five common levels have been identified. (Every occupation is not expected to require all five.) The Guidelines for the five levels are: "**Level 1** - Competence in the performance of varied work activities, most of which may be routine and predictable. **Level 2** - Competence in a significant range of varied work activities, performed in a variety of contexts. Some of the activities are complex or non-routine, and there is some individual responsibility and autonomy. **Level 3** - Competence in a broad range of varied work activities performed in a wide variety of contexts, most of which are complex and non-routine. There is considerable responsibility and autonomy, and control or guidance of others is often required. [Presumes education beyond compulsory school.] **Level 4** - Competence in a broad range of complex, technical, or professional work activities performed in a wide variety of contexts and a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and allocation of resources is often present. **Level 5** - Competence which involves the application of a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and the allocation of resources feature strongly, as do personal accountabilities for analysis and diagnosis, design, planning, execution and evaluation. [It is expected that a higher education degree will be required]" (IEL, Vol. IV, 1994, p. 55). The Industry Lead Bodies are groups of employers and a small representation from labor which are accredited by the National Council to specify the standards for the competencies and related training. As described earlier, the competencies are based on feedback from employers and employees.	Up to 50 percent of the current use of the U.K. standards system is by participants in government training programs. One of the national goals is to have 50 percent of the workforce at level 3 of the 5 levels, or the equivalent, by the year 2000. Of the 5 levels described above, levels 1 and 2 are being used by educators to design the General Certificate for Secondary Education. Training programs seem to be targeting levels 2 and 3.

Project	How was the domain identified?		What was rated?	Are there proficiency levels? If so, how are they set?
The Australian Standards *Status:* The standards system was first launched in the mid-1980's and is still under development as it becomes more fully implemented.	The standards are industry-driven and include both occupational core standards and industrial core standards. The former are broad-based and apply to all the employees in an occupation rather than to one specific job. Examples include literacy and numeracy skills. The latter identify technical knowledge and skills that are needed in a particular sector or in specialized areas. The skills standards system also provides clear information about career paths within and across industries in a common language that is based on performance and that is understandable to all groups of users - workers, supervisors, educators/trainers, and others. The information is collected through a formal occupational analysis, which is conducted by industry groups and closely guided by the National Training Board (NTB), an organization run by representatives of management, labor, and government. (Within each industry NTB recognizes a particular group as the formal representative; the group must include employers, labor, and some members of all entities of the industry.) For the occupational analysis process, NTB recommends the use of interviews, surveys, critical incident and other methods. The NTB also requires that the process not discriminate against any specific segment of the workforce. When the analysis is complete, the industry group submits the results to the NTB for review along with plans for training delivery, assessment and certification. The review process is completed in one month, after which, if the analysis is approved, industry, state and territorial governments and the educational system are held responsible for implementing the program.	The focus was on work-based standards, that is, identifying what jobs require. Occupational analyses provided this data.	The NTB has established eight levels which serve as reference points for the development of each set of industry standards (called "competency standards," meaning the knowledge, skills, and the application of the knowledge and skills to the performance required in employment). Examples of the eight levels are: "**Level 2 -** competencies mean that a person has an established work orientation and the knowledge, skills, and demonstrated capacity to perform proceduralized tasks under general supervision, and more complex tasks involving the use of theoretical knowledge and motor skills under close supervision. Preparation for Level 2 employment is generally obtained through job-specific or general training which may be certified by appropriate authorities. Level 2 training

				Who uses the standards, scales and levels and for what purpose?
typically might include an apprentice worker in many industries. **Level 4** - competencies mean that a person has highly developed skills, knowledge, or capacity for self-directed application, including the use of appropriate techniques and equipment required to perform highly complex tasks involving substantial applied theoretical knowledge and motor skills. Many of the complex tasks would be performed without supervision, and may include supervising the work of others. This category includes advanced skilled, autonomous workers and training for this category would include education and training opportunities that would lead to an initial, post-trade, or equivalent certificate or an advance certificate.	**Level 6** - competencies mean that a person has a developed capacity to make autonomous use of a high degree of applied theoretical knowledge in combination with mastery of the theoretical bases of that applied knowledge. Tasks may require developed motor skills and significant creative, planning, designing, or supervisory functions related to products, services, operations, or processes. This level corresponds to a competent senior administrator, specialist, technologist, or paraprofessional. Current courses of formal vocational education and training available to assist in preparing for employment at this level generally are those leading to an associate diploma or a diploma. In some cases, a degree may apply.	**Level 8** - competencies mean that a person has highly developed capacities to generate and use advanced levels of theoretical and applied knowledge. The tasks often require highly developed motor skills and the ability to undertake complex and major creative planning, design and managerial functions with full personal accountability and responsibility for the output of others. This level corresponds to a competent senior professional or a manager. The formal education and training necessary at this level of employment include content leading to higher degrees. Professional qualifications may also include postdoctoral research, evidence of publications and contribution to advancing knowledge in particular areas" (IEL, Vol. IV, 1994, p. 44).	The Standards are set as part of the occupational analysis conducted by the recognized industry group. The group then submits the standards to NTB for review.	The Australian standards setting movement is in use in about forty industries. The standards apply to industry and to education; to students in secondary and postsecondary school as well as to individuals now in the workforce. All levels of government and all training authorities in the country have accepted the standards as benchmarks for vocational education, curriculum development, industry training, and the accreditation of training. The educational system (through the state and territorial educational agencies) serves as the provider of the training.

Summary

This paper has included a description of two conceptualizations of skills taxonomies and the projects validating the conceptualizations, two groups of "aggregate temperature-taking tools," some of the larger private sector efforts relating to skills, and the Skill Standards Systems of the U.K. and Australia. This information is provided as background as the National Skills Standards Board deals with that task of developing a useful skills framework cutting across industries and linking industry and educational levels.

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POLICY PERSPECTIVES

Workplace Competencies: The Need to Improve Literacy and Employment Readiness

Paul E. Barton
and
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Policy Perspectives Series

Workplace Competencies: The Need to Improve Literacy and Employment Readiness

Excellence in Early Childhood Education: Defining Characteristics and Next-Decade Strategies

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Foreword

At all levels of government, education policymakers are confronting immense problems that cry out urgently for solutions. These men and women—legislators, governors, mayors, school officials, and even the President of the United States—generally agree that our schools cannot be left to operate unaltered and that the need for reform is widespread and immediate.

Policymakers know, for example, that the growing demand for early education is forcing a crisis in that field and that educators of young children now grapple with demands that are straining their resources and compelling them to redefine their mission. They listen as employers loudly lament the quality of our high school graduates, while investing millions of corporate dollars in programs that teach basic skills and workplace competencies to their newest workers. And they search diligently for programs and practices that can reverse our alarming failure to bolster the achievement levels of at-risk students.

But if the problems are numerous and compelling, there is no shortage of proposed solutions. Currently, one of the most favored reform strategies calls for implementing accountability measures that would more clearly define and assess who is responsible for student success and student failure. Thus, while the number of programs, suggestions, proposals, and techniques for dealing with such specific issues as literacy or achievement levels among at-risk youngsters is mind-boggling, many of these approaches now contain one or more strategies for holding schools accountable for student learning.

Given the intensity of the school reform debate and the abundance of ideas for remedying the Nation's educational ills, it is not surprising that many policymakers often find themselves adrift in a sea of uncollated and frequently conflicting information that does little to inform decision-making.

In an effort to alleviate this situation and to inform the education debate, the Office of Educational Research and Improvement (OERI) decided last year to commission a series of papers to address those topics that policymakers themselves told us were most pressing.

We began by surveying the major policymaking organizations and asking them to identify which school-related issues they viewed as compelling. There was remarkable agreement in the field, and it did not take very long to identify those areas most in need of illumination. We learned, for example, that policymakers are concerned about improving literacy levels and about graduating young people who are prepared to function effectively in the modern workplace. We discovered that they are seeking strategies to combat the growing crisis in early childhood education and to raise achievement levels among at-risk students. And we found that there is a genuine need to clarify the issues surrounding educational accountability, so that intelligent decisions can be made about how best to hold schools answerable for their performance.

Thus advised, we sought the most distinguished scholars we could find to address significant aspects of these issues, and we succeeded in assembling a roster of individuals whose expertise on these subjects is unchallengeable. Indeed, I am most grateful to Paul E. Barton, director of the Educational Testing Service's (ETS) Policy Information Center, and Irwin S. Kirsch, research director for ETS' Division of Cognitive and Assessment Research, who combined their considerable knowledge and skill to produce this paper on literacy and its relationship to workplace competencies.

I am also indebted to:

- Sharon L. Kagan, associate director of The Bush Center in Child Development and Social Policy at Yale University, for her paper on *Excellence in Early Childhood Education: Defining Characteristics and Next-Decade Strategies;*
- Michael W. Kirst, professor of education and business administration at Stanford University, for his paper on *Accountability: Implications for State and Local Policymakers;* and
- James M. McPartland, co-director of the Center for Research on Elementary and Middle Schools, Johns Hopkins University, and Robert E. Slavin, director of the Elementary School Program for the Center for Research on Elementary and Middle Schools, and co-director of the Early and Elementary School Program of the Center for Research on Effective Schooling of Disadvantaged Students, Johns Hopkins University, for their paper on *Increasing Achievement of At-Risk Students at Each Grade Level.*

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We asked that all the authors approach the subjects within a common framework and bring to bear their distinctive perspectives on these important issues. Specifically, we requested that they do four things:

- Describe the issue or problem being addressed;
- Discuss briefly pertinent research on the topic;
- Describe what States and/or other concerned interest groups are doing about the issue; and
- Analyze the implications of current activity—and inactivity—for policymakers at the Federal, State, and/or local levels.

Then, to ensure that this paper—and the others in this "Policy Perspectives" series—would, in fact, be valuable to the community of policymakers, we invited all of the scholars to participate in a one-day meeting where they could present their draft findings at a public forum and then engage in small group discussions that provided a unique opportunity for face-to-face peer review sessions. Both authors and reviewers were overwhelmingly enthusiastic about this process, and all of the papers were revised to reflect the feedback offered.

I want to stress, in conclusion, that it is not the purpose of this series to supply easy answers or quick-fix solutions to the complex problems confronting American education today. We did not start out to develop a set of blueprints with step-by-step instructions for implementing reform. Rather, we are seeking to promote the dissemination of knowledge in a format we hope will provide policymakers everywhere with new insights and fresh ideas that will inform their decision making and translate into strategies that will revitalize the ways in which we run our schools and teach our students.

Christopher T. Cross
Assistant Secretary
Office of Educational Research
and Improvement

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Acknowledgments

Information Services' Policy Perspectives series is one response to OERI's Congressionally mandated mission to "improve the dissemination and application of knowledge, obtained through educational research and data gathering, particularly to education professionals and policymakers." To launch the series, we invited some of the Nation's most renowned scholars to produce papers addressing those issues that policymakers told us were most pressing. This report is but one by-product of the undertaking.

Many people contributed to the success of this project. I would especially like to thank Paul E. Barton and Irwin S. Kirsch of the Educational Testing Service for consenting to produce this paper, *Workplace Competencies: The Need To Improve Literacy and Employment Readiness.* I am also grateful to those members of the policymaking community who agreed to review and comment on an early draft of this document. They are: Mary Harley Kruter, Office of Science and Technology Policy; Patricia McNeil, U.S. Department of Labor; Bernadette Toomey, National Academy Foundation; and Lisa Walker, Education Writers Association.

I am grateful to all of you.

Sharon Kinney Horn
Director
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Preface

The issues of sufficient "workplace competencies" and of the need to improve literacy and employment readiness are no longer confined to research studies and academic treatises. These are national issues, discussed in conferences and board rooms, at education summits, and on the front pages of newspapers. Thus, our purpose in writing this paper has been primarily informational: to provide those who debate, recommend, and decide, with the most accurate information we have available.

Unfortunately, this important debate has often *not* been well informed; the written word in this area is often based on simplistic rhetoric rather than on a broader understanding of the complex nature of literacy in our society. As a Nation, we are now far beyond the quest for a simple, single number of "illiterates." It is time to move on to the harder tasks of describing what school leavers and adults know and can do in the daily tasks they confront, and then of better understanding what they *need* to know—for the workplace and for a full life that provides opportunity to develop their potential.

We believe good information is a prelude to constructive action. And we offer some views on the implications of the facts we present. For assistance in developing this paper, we are indebted to the panel assembled by the U.S. Department of Education's Office of Educational Research and Improvement (OERI) to review this document in draft. They are: Christina Dunn, Andrew Kolstad, Mary Harley Kruter, Patricia McNeil, Nevzer Stacey, Bernadette Toomey, and Lisa Walker. The manuscript was also reviewed by Norman Freeberg. We thank Joanne Antonoff for her word-processing skills. We are also indebted to Kathleen Price at OERI who worked with us in the publication of this manuscript, and did so with competence and good humor.

The views here expressed do not necessarily represent the views of Educational Testing Service or the Office of Educational Research and Improvement.

Paul E. Barton
Irwin S. Kirsch

Introduction

One of the most publicized problems of this decade is what many perceive to be a huge literacy deficiency. One author has proclaimed that we are "a Nation of illiterates."* Data used in the national media have been alarming, and the sources of these numbers elusive. The truth, meanwhile, is that few systematic measures have been taken of literacy, and none has been repeated. Thus, trends in literacy proficiency cannot be accurately estimated.

While the Nation's concern with literacy appropriately encompasses all areas of living, the glare of attention often focuses on the workplace. Many employers report that they find it increasingly difficult to identify and hire literate workers, and the American Society for Training and Development (ASTD) tells us that corporations are spending hundreds of millions of dollars on remedial education. Not surprisingly, these employers are not happy about the state of affairs: they see increasing school expenditures and think that the same thing is being paid for twice.

Obviously, in order to thrive, the Nation's employers must find workers they can train. But in the global economy, the concern extends far beyond the individual firm: to many we are "a Nation at risk." More and more, Americans are realizing that competitiveness of the economy turns on the quality of the country's work force, not just on its machines, technology, and management know-how. In fact, thinking in the modern corporation has gone far beyond the days of Taylorism when a job was broken into discrete steps on a production line and an uneducated worker was trained in days—or hours.

The requirements are likely upward, at least in many important sectors of the economy and in particular employers' needs. The present technological environment has enlarged some workers' responsibilities. The lines between workers and supervisors and managers blur as "work teams" or "quality circles" are used to raise creativity and productivity. The team members put their heads together and solve problems. The members can do each other's jobs. They must be flexible. And they have to deal with print, often in more complex forms than before. In short, the requirements are rising in some areas that are highly visible to employers and to observ-

*Kozol, Jonathan. *Illiterate America*. Garden City: Anchor Press, 1985.

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ers of the economy in general, and it is against these growing demands and expectations that the adequacy of preparation for the entering work force must be viewed.

But while it is against these same rising expectations that we may be slipping, still we see no evidence that we are "a Nation of illiterates." To the contrary, we have made progress—this is a basis for optimism—and we can make more.

For example, a standard used just a century ago to judge whether or not Americans were literate was a person's ability to sign his or her name. Today, all young adults (ages 21–25) can do that.

The standard of 50 years ago, the era of World War II, was one of reading at about a fourth-grade level, a *huge* jump. Currently, 95 percent of all young adults meet this criteria.

And 25 years ago, the frequently used standard of the War on Poverty era was an eighth-grade reading level. Now, 80 percent of all young adults can read at that level.

We believe it is not useful in today's complex and varied economy and society to establish a single standard—a point we will elaborate on. But by all indices—educational achievement and school retention, for example—there has been progress in absolute terms. Meeting our needs *is* a problem we can deal with. But a proper definition of the problem and accurate information about the literacy condition are essential ingredients for success. Our purpose is to communicate knowledge and information (to the extent they exist) that can be used to inform the processes of policy-making and the judgments of policymakers.

We conclude that there is a need *now* for increased literacy skills, particularly among specific segments of the population. We also conclude that available projections of literacy and educational requirements for jobs of the future are not dependable enough to be the principal basis for action.

Profiling Young Adult Literacy

In this section we will be referring to the concept of literacy and the results of measurements based on it used for the Educational Testing Service's (ETS) 1986 report *Literacy: Profiles of America's Young Adults*, a publication of the U.S. Department of Education's National Assessment of Educational Progress (NAEP). While much of the rhetoric underlying the recent national discussion has focused on the number of "illiterates" in the population, we reject as simplistic the notion of a *single* standard for literacy, or a single point on a scale which is used to categorize individuals as either literate or illiterate. That report illustrates the point with a quote from the 1984 National Society for the Study of Education publication, *Becoming Readers in a Complex Society*.

> The often heard charge, "Johnny can't read," is a little like saying "Johnny can't cook." Johnny may be able to read the directions for constructing a radio kit, but not a Henry James novel, just as Johnny may be able to fry an egg but not cook a Peking duck. In discussing reading in the schools, we must recognize that reading involves as wide a range of different types of texts as there are types of food.

As we leave the concept of reading in the school and enter the workplace or society in general, literacy skills become even more diversified. There are different kinds of materials to read, and different levels of competencies required, depending on what life task—or workplace task—is applied to these materials. The literacy definition used for the 1986 assessment was "using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential."

Simulation tasks were constructed for assessing literacy proficiency among a nationally representative sample of young adults and reported in terms of three important and relatively distinct areas:

- Reading and interpreting *prose*, as in newspaper articles, magazines, and books. This was designated *prose literacy*.
- Identifying and using information located in *documents* such as forms, tables, charts, and indexes. This was designated *document literacy*.

- Applying numerical operations to information contained in printed material such as a menu, a checkbook, or an advertisement. This was designated *quantitative literacy*.

All three types of literacy find their applications in various adult contexts including the workplace, and all three, although differing to varying degrees, are only moderately related to the reading comprehension exercises found in school classrooms. Document literacy represents the kinds of tasks frequently associated with the workplace, and found in instruction books, repair manuals, and tables which require the worker to move from a question or problem to an answer or solution. Indeed, several published studies, including some that one of the authors participated in, support this view.

The 1986 survey itself required contacting some 40,000 households to locate and assess approximately 3,600 young adults. Each assessment interview lasted about 90 minutes, and it included some 100 questions about personal characteristics, educational experiences, exposure to the labor market, and reading activities. The results were reported on three new literacy proficiency scales—prose, document, and quantitative—where proficiency was expressed along scales ranging from 0 to 500. Levels on the scales were illustrated by examples of actual tasks that respondents estimated to be proficient at that level were likely to be capable of performing.

The sample of young adults assessed included the full range of educational levels from high school dropouts to Ph.D.s, as well as representative samples of white, black, and Hispanic young adults. While this sample encompassed the full range of literacy proficiencies in the population, the current discussion of deficiencies in the workplace generally centers on the knowledge and skills entry-level workers need to perform even at a basic level, and on the expectation they will be able to benefit from the training employers offer to entry workers coming out of the Nation's high schools. Therefore, while we will summarize the results for the full population, we will then provide more detail for high school graduates, and also look closely at young adults in various occupations.

Included in the overall findings were the following:

While the overwhelming majority of young adults adequately perform tasks at the lower levels on each of the three literacy scales, sizable numbers do not do well on moderately complex tasks.

The earlier that young people terminated their education, the less likely they were to attain moderate or high levels of proficiency.

Black young adults perform considerably below white young adults; Hispanics perform about midway between.

Only about 2 percent of the young adult population were estimated to have such limited literacy skills that the interviewer judged that the simulation tasks would unduly frustrate or embarrass them. Approximately half of this 2 percent were judged to have limited proficiency in English.

Reading exercises were also given that were used in the regular in-school NAEP assessments. Ninety-five percent of young adults were estimated to read at or above the *average* level of fourth-grade students.

Two principal conclusions were:

That while "illiteracy" is not a *major* problem in the young adult population, the demonstrated levels of "literacy" are a problem. There are large percentages who perform only in the middle range on the literacy scales.

That while the overwhelming majority are able to perform routine or uncomplicated tasks, relatively small proportions can do moderately complex tasks. A great many of these young adults will not be prepared for the workplaces of the present economy, irrespective of what these workplaces may be like in the future.

For an examination of workplace literacy, it will be helpful to take a closer look at high school graduates. While employers may find deficiencies in young adults with postsecondary degrees, they are much more likely to be disturbed about the kind of low-level literacy that they find in entry-level workers coming from the high schools. One may assume that high school dropouts are, on average, headed for difficulty in the modern workplace, and we will also illustrate their literacy levels.

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Literacy of High School Graduates

The prose, document, and quantitative literacy of 21- to 25-year-old high school graduates* is summarized in figures 1, 2, and 3. As in the case of young adults generally, practically all young adults who finished high school are able to use printed information to accomplish tasks that are routine or uncomplicated.

- For *prose literacy*, 97 percent performed at least at the *200 level* on a scale of 0–500. One task characteristic of performance at this level is writing a simple description of the type of job one would like to have (199) (See figure 1).**
- For *document literacy*, 97 percent performed at least at the *200 level*. One characteristic task directs the reader to match money-saving coupons to a shopping list of several items (211). Another task involves entering personal background information on a job application (196) (figure 2).
- For *quantitative literacy*, 93 percent performed at least at the *225 level*. A task that typifies this level requires totaling two entries on a bank deposit slip (233) (figure 3).

While there can be some solace in the finding that almost all high school graduates assessed perform at these basic levels, literacy skills seem to us distressingly limited: *relatively small proportions of young adult high school graduates were proficient at levels characterized by the moderate or relatively complex tasks.*

- For *prose literacy*, just 27 percent performed at or above the *325 level*. A representative task at this level required locating material on the basis of three bits of information that were repeated throughout a lengthy news article (313).

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*Actually, these numbers include high school graduates who reported some form of post-secondary education but who did not obtain either a 2- or 4-year degree. These results, therefore, somewhat overestimate the average literacy levels of high school graduates only.

**Tasks used to illustrate these levels are those the respondents had a high probability of being able to perform (80 percent); they are chosen to be characteristic of the kinds of tasks associated with these levels.

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Figure 1.—Percentage of high school graduates scoring at or above selected levels of proficiency in prose literacy, with tasks illustrative of various levels: 1986

Proficiency scale	Percent at or above selected levels	Example tasks at various proficiency levels
500		
400		
375	3.2 (0.8)	371—Orally interpret distinctions between types of employee benefits
350	12.2 (1.3)	340—State in writing argument made in lengthy newspaper column
325	26.6 (1.8)	
300	48.4 (1.7)	313—Locate information in a lengthy news article
275	66.4 (1.4)	277—Write a letter to state that an error has been made in billing
250	81.4 (1.3)	262—Locate information in sports article
225	91.2 (0.9)	
200	96.7 (0.6)	199—Write about a job one would like
0		

NOTE: High School graduates include those who had some postsecondary experience, but no degree. Standard errors are shown in parentheses.

SOURCE: National Assessment of Educational Progress, *Literacy: Profiles of America's Young Adults, 1986*.

Figure 2.—Percentage of high school graduates scoring at or above selected levels of proficiency in document literacy, with tasks illustrative of various levels: 1986

Proficiency scale	Percent at or above selected levels	Example tasks at various proficiency levels
500		
400		
375	2.6 (0.5)	
350	10.9 (1.3)	
325	28.0 (1.7)	334-365—Use bus schedule to select appropriate bus for given departures and arrivals
300	50.2 (2.1)	300—Follow directions to travel from one location to another using a map
275	70.6 (1.5)	278—Use index from an almanac
250	83.4 (1.2)	249—Locate intersection on street map
225	91.8 (0.8)	221—Enter date on a deposit slip
200	96.9 (0.5)	196—Enter personal information on job application
175	99.2 (0.2)	181—Enter caller's number on phone message form
150	99.8 (0.1)	160—Locate expiration date on driver's license
0		

NOTE: High School graduates include those who had some postsecondary experience, but no degree. Standard errors are shown in parentheses.

SOURCE: National Assessment of Educational Progress, *Literacy: Profiles of America's Young Adults, 1986.*

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Figure 3.—Percentage of high school graduates scoring at or above selected levels of proficiency in quantitative literacy, with tasks illustrative of various levels: 1986

Proficiency scale	Percent at or above selected levels	Example tasks at various proficiency levels
500		
400		
375	4.5 (0.7)	376—Estimate cost using grocery unit-price labels
350	13.4 (1.3)	356—Determine tip given percentage of bill 340—Plan travel arrangements for meeting using flight schedule
325	29.7 (2.0)	337—Determine correct change using menu
300	49.4 (1.9)	293—Enter and calculate checkbook balance
275	68.8 (1.4)	281—(two tasks)
250	83.0 (1.1)	
225	93.1 (0.7)	233—Total bank deposit entry
200	97.2 (0.5)	
0		

NOTE: High School graduates include those who had some postsecondary experience, but no degree. Standard errors are shown in parentheses.

SOURCE: National Assessment of Educational Progress, *Literacy: Profiles of America's Young Adults, 1986*.

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- For *document literacy*, only 11 percent were estimated to be at or above the *350 level*, where they were likely to be able to do tasks such as figuring out from a bus schedule the time on a Saturday morning when the second bus arrived at the downtown terminal (334).

- For *quantitative literacy*, just 30 percent were estimated to be at or above the *325 level*, where a typical task required the reader to examine a menu, to compute the cost of a specified meal, and to determine the correct change from a specified amount (337). (Only about 13 percent were at the 350 level where performance included figuring the exact amount of a 10 percent tip.)

Needless to say, high school dropouts performed much less well than graduates. On the prose scale, just 10 percent were able to find information in the news article, compared with 27 percent for graduates. On the quantitative scale, the results were similar. Just 10 percent were able to compute the cost of a meal from a menu, compared with 30 percent for graduates.

The above information is gleaned from examining just two levels on each of the three scales. Everyone can look at representative tasks at different proficiency levels and make judgments about what proportions of young adults are ill prepared for life's challenges. The levels of literacy needed by any individual depend on the demands he or she faces in the different life areas of work, home, and community. And within those areas, the questions become: What job? Doing what in the home? Doing what in the community? The NAEP study has measured what young adults can do; it has not measured what different settings require of them. For example, among high school graduates, fewer than 1 in 20 is estimated to be at or above the proficiency level (375) needed to estimate cost by using grocery store unit price labels. Is that acceptable in the present and future workplace?

These levels would seem to be disappointing and inadequate, if society requires a more competent labor force in an economy increasingly shaped by technology.

Not only are small proportions of young adults achieving advanced levels on the literacy scales, but, as pointed out above, proficiency levels vary considerably among different populations of young adults. (The differences described below are based on the entire sample of 21- to 25-year-olds, instead of only high school graduates.)

- Black young adults, on average, perform significantly below white young adults on the literacy scales, with Hispanic young adults

performing midway between. Among young adults, 86 percent of blacks, 94 percent of Hispanics, and 98 percent of whites perform at least at the *200 level* on the *prose literacy* scale. Eleven percent of black, 24 percent of Hispanic, and 43 percent of white young adults perform at or above the *325 level* on this scale.

- The longer the time spent in school, the higher the literacy proficiency. Again using the prose scale, registering at or above the *200 level* are 71 percent of those with 8 or fewer years of school, 88 percent of high school dropouts, and 97 percent of the young adults who have a high school diploma or some postsecondary education. At or above the *325 level* are 0 percent of those with 8 or fewer years of school, 10 percent of high school dropouts, 27 percent of those with a high school diploma or some postsecondary education, and 63 percent with a postsecondary degree.

While the use of simple print for routine tasks is within the grasp of most young adults, large numbers have clearly failed to develop an adequate level of literacy skills. The deficiency identified here is in young adults' skills at dealing with the more complex tasks embedded in print materials. Evidently, the printed word usually can be decoded, but the information obtained is not processed correctly to solve the problem. This is a key finding for programmatic efforts aimed at improvement, and one that is as significant for school curricula as it is for shaping adult literacy programs. It is also important in programs aimed at developing workplace literacy.

Occupations and Literacy

It would, of course, be desirable to know what level of literacy specific occupations require. This would involve some systematic approach to looking at occupations and determining where they belong on the NAEP literacy scales. One method would be to use panels of employers to make determinations on a judgmental basis. Another would be to use the established tools of job analysis to systematically examine an occupation and determine its literacy requirements.

So far, no research has been done that would permit confident statements about the literacy levels required for specific jobs; however ETS is currently conducting a feasibility study to determine how job analysis might be used to identify literacy requirements of five occupations. The results should be available this year.

Still, some perspective can be gained by looking at the demonstrated literacy proficiencies of people who are employed in a particular occupation. This, of course, begs the important question of what the occupation requires. Employers may have settled for less than they wanted; productivity might be greater, and training and remedial education costs might fall, if literacy levels were higher. But despite these caveats, the method offers an advantage not to be ignored: the people to be assessed for proficiency are actually employed in the occupation; the market test has been applied. We do know the occupations of the 21- through 25-year-olds in the Young Adult Literacy Assessment, and we can estimate the literacy proficiencies of these young adults in a particular occupational category. But while this can be done with the literacy assessment, the estimates are necessarily limited by the sample size to broad occupational categories. These are managerial, professional, technical, sales, clerical, craft, operative, and service.

The sample of young adults contains many youth who are still in school full time, many who are both learning and earning, and many who have left education and are established in the occupational world. Of those who have left education, some did so as early as ages 16 to 18 when they dropped out or graduated from high school, while others just recently completed their college work. About one in four (26 percent) reported being enrolled in school at the time of the survey, and 69 percent of these

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young adults were full-time students, while 31 percent attended class part time.

Of course, many of the students, both full time and part time, were working and thus reported an occupation. However, these young adults have most likely not yet settled into entry-level positions in the occupations that they are aiming for. To take an extreme example, a doctoral student may be working part time driving a taxicab; thus, his or her literacy level is not representative of that job's requirements.

We are, however, able to separate the sample by the students' work status, so as to get near to the group that has completed the transition to work. Of the total sample, 54 percent—an estimated 9.6 million 21- to 25-year-olds—had been working full time for a full year. This group was largely settled into the work world, although some were attending school on a part-time basis. Table 1 shows the average (mean) performance of these full-time workers by occupational category in terms of the three literacy scales.

Table 1.—Mean proficiency scores on prose, document, and quantitative literacy tasks of full-time workers, age 21–25, by occupation: 1986

Occupation	Prose	Document	Quantitative
Managerial	309.7 (4.0)	308.3 (3.7)	310.2 (6.8)
Professional	315.2 (7.5)	323.4 (5.4)	312.1 (7.2)
Technical	308.7 (7.2)	311.2 (6.7)	303.8 (8.0)
Sales	290.2 (6.4)	296.7 (4.8)	298.1 (7.5)
Clerical	299.8 (4.2)	301.1 (4.3)	301.0 (3.5)
Craft	273.1 (4.9)	278.6 (5.7)	281.2 (6.5)
Operative	280.5 (4.8)	281.5 (5.1)	284.4 (5.2)
Service	287.7 (4.9)	285.7 (5.2)	292.0 (5.0)
Laborers	278.4 (9.0)	277.0 (8.6)	283.2 (9.2)

NOTE: Numbers in parentheses are estimated standard errors.

SOURCE: Unpublished data from the National Assessment of Educational Progress, *Young Adult Literacy Study, 1986,* Educational Testing Service.

The reader may find it helpful to refer back to figures 1 through 3 for the meaning of various scale scores, in terms of the kinds of tasks these young adults can probably perform. The sample errors are such that small differences in scores, typically 5 or 6 points, should not be viewed as significant. (The general rule of thought is not to judge as significant those differences that are less than 2 standard errors apart.)

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Table 2.—Percentages of young adults at or above selected points on the document literacy scale: 1986

Average proficiency of young adults reporting full time employment by various occupational categories		Selected points on the scale	Total	Race/ethnicity			Levels of education			
				White	Black	Hispanic	0–8 years	9–12 years	H.S. diploma and/or more	2 or 4 year degree or more
		500								
		350	20.2 (1.3)	24.3 (1.6)	2.5 (0.5)	6.7 (2.0)	0.7 (0.7)	0.8 (0.5)	10.9 (1.3)	40.7 (1.9)
323 (5.4)	Professional									
311 (6.7)	Technical	325	37.6 (1.6)	44.0 (1.8)	9.0 (1.1)	20.8 (3.1)	0.7 (0.7)	7.5 (1.4)	28.0 (1.7)	63.2 (1.8)
308 (3.7)	Manager									
301 (4.3)	Clerical									
297 (4.8)	Sales	300	57.2 (1.7)	65.4 (1.7)	19.8 (1.5)	37.0 (4.1)	11.0 (9.6)	22.0 (2.9)	50.2 (2.1)	81.8 (1.5)
286 (5.2)	Service									
281 (5.1)	Operative									
279 (5.7)	Craft	275	73.1 (1.2)	80.8 (1.1)	38.7 (2.6)	54.7 (3.8)	21.1 (12.4)	39.5 (3.6)	70.6 (1.5)	91.4 (1.0)
277 (8.6)	Laborer									
		250	83.8 (1.0)	89.9 (0.8)	55.5 (2.7)	69.0 (3.4)	31.5 (10.7)	59.1 (3.9)	83.4 (1.2)	96.0 (0.7)
		225	91.0 (0.8)	95.0 (0.7)	71.0 (2.2)	84.4 (1.6)	47.3 (9.5)	72.0 (3.3)	91.8 (0.8)	98.9 (0.3)
		0								

NOTE: Numbers in parentheses are estimated standard errors.

SOURCE: Unpublished data from the National Assessment of Educational Progress, Young Adult Literacy Study, 1986.

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What table 1 says is that the literacy levels of young adults reporting various occupations do differ considerably. On the document scale, the range is from 323 (professionals) down to 277 (laborers). Only 37.6 percent of *all* young adults in the literacy assessment were estimated to be at or above the 325 level on the document scale. In contrast, 73 percent were at the 275 level or above, about where the average laborer scores.

The distribution of mean proficiency scores for these full-time workers is similar on the other two scales, although the range is not quite so large. For prose literacy, the spread from high to low is 37 points, while for quantitative literacy it is 31 points. These compare to a spread of 45 points for document literacy. Because of the nature of the tasks on the document scale, we have considered it to be the most useful of the three scales for reflecting workplace literacy. Moreover, we see from this comparison that it does have the largest range in average proficiency among the occupations.

Table 2 shows the degree to which young adults and subgroups of young adults achieve these average document proficiency levels possessed by young full-time workers who have made the transition from school. While we will not summarize all the information in the table, we call attention to some disturbing facts. For example, more than 6 in 10 black young adults do not reach a proficiency equal to the average for "laborer," nor do almost half of Hispanic young adults. About 6 in 10 high school dropouts have not reached this level, and almost 8 in 10 are not at the average for clerical workers. In addition, half of high school graduates have failed to achieve the average proficiency of clerical and sales workers.

Again, these are the average proficiencies of the young adults who reported being in these occupations at the time of the survey. We cannot say these are levels the employers thought were necessary, but they are the people who were hired. Also, given the young ages, these levels are more characteristic of entry-level workers in these occupations than of experienced workers. Finally, there is a large range of literacy proficiencies within any single occupation; a much finer classification of occupations would be necessary to establish a narrow range. Having stated these qualifications, we do believe this kind of knowledge, on a more refined basis, would help illuminate the literacy competencies needed in the workplace.

The Fourth *R:* Work Force Readiness

The foundation for measuring prose, document, and quantitative literacy has been laid with the conceptual work, measurement, and "scale anchoring" undertaken at ETS for the young adult literacy study, described above. The workplace needs the kinds of literacy measured on these new scales. But employers are asking for these skills and more.

In addition to seeking workers who can deal successfully with print, employers have a list of skills and competencies they need now, and for which they project an increasing demand in the work force of the future. Many surveys of employers and reports of employer organizations have described these needs, but the National Alliance of Business characterized them most succinctly as the "Fourth *R*: Work Force Readiness."

In the first half of the 1980s, a number of national, State, and local surveys examined what employers wanted entry-level workers, or high school graduates, to know and be able to do. Although these surveys were generally carried out or sponsored by employer organizations, the questions were not always the same, and the specific words used often differed. Still, the central message came through loud and clear: there were several characteristics these new work force members needed to have, and employers were not seeing enough candidates who had them. A brief summary of the conclusions of the national-level studies will convey the messages employers have been sending.

A Conference Board Survey of business executives found, for example, that while computer skills were on the rise, new workers' knowledge of basic skills was deteriorating. Indeed, 65 percent reported seeing declining abilities in reading, 74 percent in writing, and about 60 percent in mathematics. Current education reforms address these skill areas. However, these executives also reported that *attitudes* toward work and the workplace were a primary problem, and few were hiring recent high school graduates.

The Committee for Economic Development surveyed a sample of Fortune 500 companies, as well as 6,000 small firms. Both the large and small companies agreed that the characteristics desired—and difficult to find in

young applicants—were "striving to work well," "learning how to learn," "priority setting," "communicating," and "working well with others."

When Research and Forecasts, Inc., conducted a phone survey of a sample of Fortune 1,300 companies, employers ranked character first in the qualities looked for when they made hiring decisions. Job experience was ranked second, and education third. With regard to education, 7 in 10 thought that "it is more important for students to learn how to think—than it is to learn facts and figures."

A survey of personnel officers, carried out by the Center for Social Organization of Schools at Johns Hopkins University, ranked the qualities these executives looked for in hiring entry-level workers. The rank order was as follows: (1) strong impression in interview; (2) strong recommendation from a firm's manager; (3) strong letters from previous employers; (4) character references; (5) strong scores on written test; and (6) strong school grades.

A survey sponsored by the National Association of Manufacturers found that employers wanted schools to teach both general and specific employability skills, including attendance, punctuality, and good work attitudes.

A U.S. Department of Education survey of executives concluded that "the definition of basic skills typically used by employers includes not only the ability to read and write, but also computation, communication, and problem-solving skills." These executives believed that "schools should emphasize the importance of good habits such as self-discipline, reliability, perseverance, accepting responsibility, and respect for the rights of others."

Beginning in 1984, a substantial number of major employer organizations issued reports reiterating the skills employers need and urging educators to action. These reports, together with the surveys summarized above, established considerable concern that too many young people lack the skills employers seek.

In *Investing in Our Children*, issued in 1985, the Committee for Economic Development emphasized (among other things) the "invisible curriculum" that transmits the traits students should acquire in school. The report urged "schools and teachers to institute policies and practices that are specifically designed to encourage self-discipline, reliability, perseverance, and other positive traits." It also recommended regular assessments both of high school graduates' "employment readiness" and of employers' needs.

In 1984, the National Academy Press published *High Schools and the Changing Workplace: The Employers' View.* Composed primarily of employers, this study group concluded that the critical core competencies "include the ability to read, write, reason, and compute; an understanding of American social and economic life; a knowledge of the basic principles of the physical and biological sciences; experience with cooperation and conflict resolution in groups; and possession of attitudes and personal habits that make for a dependable, responsible, adaptable, and informed worker and citizen."

In 1987, the National Alliance of Business issued *The Fourth R: Work Force Readiness.* Work force readiness, the report said, "includes thinking, reasoning, analytical, creative, and problem-solving skills, and behaviors such as reliability, responsibility, and responsiveness to change."

In *Training America: Strategies for the Nation,* the American Society for Training and Development joined with the National Center for Education and the Economy to describe the skills workers will need if they are to participate as full members of the autonomous work teams that employers are increasingly using in production. This 1989 report concluded that team members will need "high levels of interpersonal teamwork, negotiation, and organizational skills—skills that enhance group effectiveness—as well as leadership skills."

Still another study, *Workplace Basics: The Skills Employers Want,* was issued by ASTD and the U.S. Department of Labor in 1988. This document summarized the basic skills in a very convincing manner, and we offer them as the best composite of all the messages contained in the decade's surveys and reports.

> 3 *R's,* Reading, Writing, Computation. [We believe that from the employer's standpoint these are well captured in the three literacy scales described above—supplemented by assessment of writing.]
>
> Learning to learn
>
> Communication: Listening and Oral Communication
>
> Creative Thinking/Problem Solving
>
> Interpersonal/Negotiation/Teamwork
>
> Self-Esteem/Goal Setting-Motivation/Personal and Career Development
>
> Organizational Effectiveness/Leadership

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When the skill needs of the workplace are discussed in the media, the attention is usually wholly focused on formal education or on literacy. These are very important considerations, not to be taken lightly or downplayed. But they are just one component of the ability required to function in the modern workplace. If a young person can deal well with print, but does not listen carefully to instructions, lacks personal discipline, and fails to function effectively in group efforts, then most large employers believe that there will be a deficiency in workplace functioning.

What we argue, then, is that in addition to giving attention to prose, document, and quantitative literacy, this expanded list of skills and characteristics must be addressed. These skills have not become part of any large-scale assessments of students and young adults, so nothing is yet known about the extent to which new workers are aware of their relative importance, let alone possess them. Also, little exists in the way of knowledge regarding whether and to what extent schools emphasize these abilities. And, finally, there are significant questions regarding how skills such as teamwork can be assessed. Indeed, careful development work would be required to field such an expanded assessment. Still, we do know that employers frequently find these skills missing in young people applying for jobs.

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Literacy in the Future Workplace

The typical discussion of workplace literacy needs dwells first on *current* employer experience; it moves quickly to an exposition of the rapid advancement in literacy requirements, and then predicts a growing mismatch between skills workers have and those the workplace needs. We are comfortable with the proposition that there now exists a large mismatch between proficiencies and needs; we are much less so with projections that, based on occupational requirements, claim a growing mismatch in the future.

Looking at the post-World War II period as a whole, it can be said with some confidence (although it would take the writing of a book to firmly establish it) that there has been a gradual "creeping up" of the education and literacy requirements of jobs. But it is hard to find evidence that there has been any sudden or rapid escalation in those requirements. It is clear, for example, that in each decade more people in the same occupational classifications have possessed more education, but it is not known how much of that gain has been due to steady advances in school completion at the various levels, and how much to changes in the jobs themselves. Another confounding fact is that a market system results in employers seeking the best prepared labor supply that the supply and demand situation affords them. Still, they will often settle for lesser skills when workers are in short supply. One example is military recruitment: when supply decreases, the military is forced to choose among lower ability levels to meet manpower requirements. Technological advances are also thought by a great many to raise educational requirements; at the same time, however, technology has been widely used to replace skilled labor, as well as to eliminate people and jobs entirely. This is how many productivity increases have been achieved.

One of us (Barton), when asked to predict the future, is on record as saying (in 1986) that

> We simply *do not know* how technological changes in methods of production and service delivery, organizational changes in the management of production, creation of new products, and thorough advertisement, the creation of an effective demand for them, and changes in the international market, will shape education requirements in the future. Focus on the dramatic factors that raise edu-

cation requirements may be overshadowed by more mundane developments. For example, at Christmas of 1983, the phenomenal sale of Cabbage Patch Dolls was largely a media feat—they required no new skills to manufacture. Tens of thousands of young people have lost jobs pumping gas because of the relatively new "service stations" where only one person is required to take money. A raft of new low-skilled jobs were created—in the establishment of inspection stations in airports. . . .

In 1987, the evidence was sifted by the Panel on Technology and Employment's Committee on Science, Engineering, and Public Policy, and reported in *Technology and Employment*, published by the National Academy Press. The conclusion: "Like the literature and evidence on the employment impacts of technological change, the empirical evidence of technology's effects on skills is too fragmentary and mixed to support confident predictions of aggregate skill impacts. Despite this uncertainty, however, the evidence suggests that the skill requirements for entry into future jobs will not be radically upgraded from those of current jobs."

A starting point in any effort to see into the future of educational requirements is to be able to project the occupations and the numbers employed in them, and that itself rests on prior work of constructing an "input-output matrix" of the U.S. economy. From these projections, some idea of educational requirements can be gleaned, although difficulties remain. (For example, occupations with the same name can involve changed job content.) While the U.S. Department of Labor's Bureau of Labor Statistics (BLS) has a pretty good record in making these projections, they remain approximations of the future. Harold Goldstein, formerly an associate commissioner of BLS responsible for projections, has evaluated their accuracy. The results were as follows:

	1960–75	1970–80
On target	39.5%	32.8%
Close	39.5%	26.8%
Not close	21.1%	40.6%

That the earlier efforts were more on target than the later ones is not encouraging, although BLS has made many improvements in the estimating methodology since the 1980 projections.

Obviously, these occupational projections are frequently the basis for statements about what the future holds, and the *fastest growing* occupations are pointed to as having higher educational requirements. In the BLS projections for the period 1988 to 2000, the 10 *fastest growing* occupations are:

Paralegal personnel	+ 75%
Medical assistants	+ 70%
Home health aides	+ 68%
Radiological technologists and technicians	+ 66%
Data processing equipment repairers	+ 61%
Medical records technicians	+ 60%
Medical secretaries	+ 58%
Physical therapists	+ 57%
Surgical technologists	+ 56%
Operations research analysts	+ 55%

While these occupations conjure high educational requirements, and most require postsecondary degrees, they account for a job growth of only 694,000, out of a projected total job growth of 18 million during the last 12 years of this century.

In terms of numbers of jobs projected, a quite different picture emerges. The top 10 occupations in terms of absolute job growth are:

Salesperson, retail	+ 730,000
Registered nurses	+ 613,000
Janitors and cleaners	+ 556,000
Waiters and waitresses	+ 551,000
General managers and top executives	+ 479,000
General office clerks	+ 455,000
Secretaries except legal and medical	+ 385,000
Nursing aides and orderlies	+ 378,000
Truck drivers	+ 369,000
Receptionists and information clerks	+ 331,000

These 10 occupations account for almost 5 million projected new jobs, and from 6 to 8 of the occupations are not intuitively associated with increasing literacy requirements, although the literacy standards employers

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have for current openings may often exceed skills of entry workers. Following these 10, in the order of growth, are cashiers, guards, computer programmers, food counter workers, and food preparation workers. Taking these occupations apart and forecasting their educational requirements is no easy task.

Recently, the Hudson Institute, in its report *Work Force 2000,* attempted to estimate the educational requirements of jobs in the year 2000, by combining the BLS occupational projections with the scales of educational requirements used in the *Dictionary of Occupational Titles,* published by the U.S. Employment Service. The Hudson Institute reported that the average rating of language requirements for current jobs was 3.1 on a scale of from 1 to 6. The "fast growing" occupations were rated at 3.8, the "slowly growing," 2.7, and the "declining," 1.9. The report concluded that "the fastest growing jobs require much higher math, language, and reasoning capabilities than current jobs, while slowly growing jobs require less."

These numbers suggest some shift toward higher requirements. But we don't know from this report exactly how "fastest growing" jobs are tabulated; we have seen from the BLS projections that occupations with a high percentage growth may be on a small base, and the *numbers* of jobs in such categories relatively small. In the separately available appendix to *Work Force 2000,* a table provides scale ratings for *all* jobs in 1984 and *all* jobs projected for the year 2000; the language scale score for 1984 is 3.1, compared with 3.2 for 2000. The difference is well within the margin of estimating error. Nevertheless, the *Work Force 2000* report has pioneered in estimating future educational requirements, and this marriage of educational requirements with occupational projections is a very promising approach and is to be encouraged.

The job *openings* in the year 2000 will be in *all* occupational categories, not just in the net increase in jobs in the fastest growing occupations; there will also, of course, be positions available in those occupations registering a net decline in average employment. There is a constant milling about in the labor force. Between 1988 and 2000, the BLS estimates that 43 million people will enter the labor force and that, taking account of labor-force withdrawals, the net number of new entries will be 19 million people. No estimate has been made of the educational requirements that those who enter jobs in the year 2000 will be expected to meet.

One thoughtful comment about change was made in the National Academy of Science report *High Schools and the Changing Workplace:*

> The pace of change affecting entry-level jobs will not differ much from that of the past but, as graduates mature and move out of entry-level jobs, the effects of change may become more pronounced. [The many changes] imply a continuous need to understand and master constant technical change.
>
> From the worker's standpoint, the nature of many jobs will change in the coming years, although their titles will remain the same. Obviously, the degree of change will vary from job to job and industry to industry, sometimes drastically, sometimes slightly.

A National Research Council report, *Education for Tomorrow's Jobs*, offered this assessment:

> There is no agreement of what these skill requirements will be or even in the general direction of change.
>
> The precise direction this change will take is even more difficult to specify. . . . Given the uncertainty regarding the skill requirements of the economy, it is essential that the education of America's young people be designed to enhance their abilities to adapt as necessary to these changing requirements.

Two researchers who have written throughout the 1980s on the educational requirements of jobs are Russell W. Rumberger and Henry M. Levin. They have just published a reanalysis, entitled *Schooling for the Modern Workplace.* The principal conclusion was that:

> The average educational requirements of future jobs will not be significantly different than current jobs, as both high-skilled and low-skilled jobs will continue to exist in the future economy.

This discussion by no means is meant to suggest that the Nation should be less vigilant about raising literacy levels. The evidence is to the contrary—*present literacy levels are much too low to meet current needs and expectations.* Further, there is no reason to expect needs to diminish, even if they advance slowly or not at all. From the labor supply standpoint, we face a future where minority populations with traditionally lower educational attainments and traditionally lower literacy levels will be a growing proportion of new labor force entrants. Thus, society will have to run faster just to stay in the same place.

Moreover, we do counsel against failing to press onward in efforts to predict the future occupational structure and its underlying educational requirements.

Some Implications and Recommendations

1. Addressing Inadequate Literacy

We have stated, and reiterated, the distinctions between the common approach of "counting the illiterates" and the more sophisticated strategy of profiling the population on literacy proficiency scales. We have emphasized this distinction for two reasons. First, literacy is a complex set of socially practiced knowledge and skills that needs to be understood in terms of *what* workplace, doing *what* kinds of tasks, and delivered in *what* kinds of training and education programs. If the problem is not framed correctly, the answer derived will be the wrong one.

The second reason is that the nature of the problem cannot be measured if the population is sorted into just two groups. What we have seen is that most young adults, high school graduates, and, to a lesser extent, high school dropouts can perform simple tasks conveyed through the printed word. Meanwhile, most illiteracy programs seem aimed at teaching adults to read the printed word. But while there are significant numbers of adults who can benefit from this type of training, they are not our major difficulty. Rather the larger problem, in terms of numbers, are those who can read at some basic level, but seem to lack the necessary information-processing skills that would enable them to carry out the kind of moderately complex tasks frequently encountered in everyday life.

These are the facts with which workplace literacy campaigns must come to grips. How are these information-processing skills to be improved? Are the programs we are creating directly addressing them? Such discussion raises, in turn, the important question of whether better ways to teach the current curriculum are needed or whether the need is to rethink not only how schools teach but what is taught.

2. Expanding Measures of Proficiency in Literacy Tasks Beyond Classroom Reading

One of the problems employers and others concerned with literacy encounter is that the existing instruments available to assess literacy are geared to measuring what students can do in school classroom-type read-

ing exercises. The kinds of instruments ETS-NAEP used in the young adult literacy assessment (the results of which are described above) are not currently available for testing individuals. Such instruments would, however, give a truer picture of the skills entry workers have, and permit more appropriate placement in remedial programs. ETS is currently under contract to create such a test for clients of several U.S. Department of Labor programs—Unemployment Insurance, the Employment Service, and the Job Training Partnership Act.* Not only will this secure test be available for public use by summer 1991, but ETS is also under contract to produce a nonsecure test of adult literacy for Workplace Resources, a division of Simon & Schuster, Inc.

With measurement instruments that identify the level of literacy attainment and that are linked with instruction geared to raising workers and potential workers from where they are now, workplace competencies can be increased. New measures, however, are only one step; people who diagnose literacy needs and develop and operate literacy programs need to understand the distinction between classroom reading proficiency and real life literacy requirements and gear programs to raising literacy levels.

3. The Future is Now

We have concluded that there is *now* a very large gap between the literacy skills possessed by a large proportion of young adults and the needs of the workplace. With the proper approach, this gap can be addressed now; the problem is upon us. Also, we do see an increasing problem in a future that can be foretold: a growing percentage of new labor force entrants will be from minority groups whose educational performance has traditionally lagged behind that of others. If this gap is not closed soon, society will have to run faster just to stay in the same place, since those youth with lower literacy levels will become an increasing proportion of the total.

At the same time, we are not comfortable resting the case with projections that conclude, as so many have recently done, that the educational requirements of jobs are advancing rapidly. In any event, the Nation does not have the luxury of waiting until a future problem develops, since an urgent need exists for action now.

We have said that there will be change, and this is particularly true in how employment organizations are structured; we will see more coopera-

*The contract also provides for profiling the literacy proficiency of these three populations.

tive effort and greater reliance on worker initiative. This will affect both younger and older workers, and will require that they be able to adapt. Otherwise, their worklife transitions will be rocky, and industrial productivity will suffer. Barton commented on these trends, already well evident, in 1982: "As workers are expected to participate more in problem solving and decision making, a greater premium will be placed on broad preparation as compared to narrower skill training. I would speculate that the need will be for more teaching of problem-solving skills, teamwork methods, and knowledge of how organizations function."

4. Improving Literacy Skills in the Schools

To raise literacy as it is defined here, instructional practices must be broadened. Although the two are obviously related, a distinction has now been established between the knowledge and skills associated with reading in school settings and those associated with performing tasks frequently encountered in adult contexts outside the schools. Despite many decades of theory and research on how young people learn to read and how reading is best taught, the book is not closed on the subject of acquiring literacy. Using the new literacy scales, we need to assess *literacy* in the schools, beginning in middle school, if we are to do better in aiding its development.

There are good reasons to believe that traditional classroom approaches fall short in teaching the kind of problem-solving tasks used in the literacy assessment. Students may need to be put into problem-solving situations that give them greater opportunity to use and apply these skills and strategies—or at least be provided with classroom simulations of such experience. This was the view expressed in the recent report *Training America: Strategies for the Nation*, issued by the National Center on Education and the Economy and the ASTD:

> Employers have long been advocates of an applied pedagogy. They argue that learning that occurs in some functional context produces better students as well as better employees.

This view gains support from the research described in Sylvia Scribner's and Joy Stevens' 1989 report, *Experimental Studies on the Relationship of School Math and Work Math*. They conclude: "It appears from the high level of literality observed in our studies, that school math instruction does not promote the use of expert problem-solving strategies in nonschool situations. This observation is in keeping with judgments reached by a number of educators on the basis of student math performance in school and test

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situations." What they suggest is "to situate some aspects of math instruction in contexts of actual practice." They are not the first to caution against divorcing the classroom from the rest of life: "As societies become more complex in structure and resources, the need for formal or intentional teaching and learning increases. As formal teaching and training grow in extent, there is danger of creating an undesirable split between the experience gained in more direct associations and what is required in school." What John Dewey said a long time ago is being proven by scientists today.

We urge the development of more instructional approaches that involve or simulate real experience.

5. Improving Measures and Tools for Evaluation

An Employment Readiness Profile

While literacy skills are of great importance to employers and productivity, employers have made it clear that they have requirements beyond literacy and that the characteristics they seek are in short supply. (These "employment readiness" characteristics are reviewed above in the section "The Fourth *R:* Work Force Readiness.") We believe that useful assessment instruments can be developed to track national progress in all of these areas. Such an effort should be carried out with the participation of employers and employer organizations, as well as labor market experts and educators. We have called this an Employment Readiness Profile; it could be administered periodically to national samples of school leavers, to help track national progress in developing a work force that can meet coming competitive challenges.

Tracking Literacy: Comparable Measures Over Time

Literacy experts are continually asked: Is there more or less literacy than 10 or 20 years ago? While there are grounds for making guesses, the truth is unknown. Literacy measurement has been sporadic; it has used different definitions and concepts; and it has been applied to different age groups. One measure of concern about literacy is willingness to periodically measure it in a consistent manner. A start has been made with the upcoming National Adult Literacy Survey that ETS will conduct under contract with the U.S. Department of Education. Not only will it survey all adults ages 16–64, but it will commence to track trends by permitting comparisons between the 21- to 25-year-olds of 1986 and those of 1992. These popu-

lations will also be compared with enrollees in Job Training Partnership Act programs, Employment Service applicants, and Unemployment Insurance claimants assessed in 1990.

Developing Literacy Tasks From Workplace Materials

While we believe that the conceptual and scaling approaches used for the young adult literacy assessment, with its prose, document, and quantitative literacy scales, are appropriate for workplace use, additional resources for developing assessment items could increase their usefulness.

While literacy would still be reported on the same scales as the NAEP assessment, these additional tasks—assessment items identified with workplace settings—could be developed with the aid of employers. For example, the prose tasks could use print found in a variety of work settings; the documents would be kinds frequently encountered in employment, and so would the quantitative tasks. However, while the tasks would be drawn from workplace settings, they would have to be of general usefulness in simulation exercises. They could not be so dependent upon context as to require specialized knowledge on the part of the test taker. If items could not be developed to meet this criteria, such an effort would not be feasible.

Analysis of Occupations

Much progress has been made in measuring literacy proficiencies. A lot more will occur when the new National Adult Literacy Survey is completed. But more knowledge is needed about the literacy levels that different occupations require, particularly the typical entry-level occupations.

We have suggested one line of analysis in showing the actual literacy levels of the young adults in particular occupations in the 1986 study. ETS is also using job analysis (called literacy audits) in a limited feasibility study of five occupations. Expert judgment by panels of employers is another approach.

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By the nature of this assignment, we have dwelt on the literacy needs of the workplace. And to some extent, we have contrasted workplace tasks with those of the classroom. By making a sometimes arbitrary distinction between the workplace and the school, we do not want to contribute to widening the chasm which has existed, and is now the source of some of the growing consensus about the inadequacy of literacy skills.

The larger point we would close with is that to envision distinct, separable kinds of literacy that are called upon in isolation one from another is not a very useful concept. Specialized literacy skills are not things that can be turned on and off in different settings. Life is not so compartmentalized; it is, in fact, a seamless web.

All citizens need a broad base of literacy skills to function in the school, in the family, in the community, in the voting booth, and in the workplace. The challenge is to understand how such skills and knowledge in these several contexts are similar, and how they are different, as part of a critical effort to find ways to promote their development.

Our desire has been to look at literacy through the window of the workplace, but as one window in a house with many rooms. Through this window, we see prose, document, and quantitative tasks that occur with some regularity in our society. More importantly, for too many young adults in our society, these tasks represent competencies that are not being acquired. Unless something is done, the percentage of young people who demonstrate these deficiencies is likely to grow over the next decade. As a Nation, we will see these deficiencies impact greatly on our social and economic fabric.

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MEMORIAL LECTURE Series

SETTING PERFORMANCE STANDARDS: CONTENT, GOALS, AND INDIVIDUAL DIFFERENCES

BY

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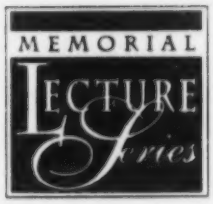
William H. Angoff
1919 - 1993

William H. Angoff was a distinguished research scientist at ETS for more than forty years. During that time, he made many major contributions to educational measurement and authored some of the classic publications on psychometrics, including the definitive text "Scales, Norms, and Equivalent Scores," which appeared in Robert L. Thorndike's Educational Measurement. Dr. Angoff was noted not only for his commitment to the highest technical standards but also for his rare ability to make complex issues widely accessible.

The Memorial Lecture Series established in 1994 honors Dr. Angoff's legacy by encouraging and supporting the discussion of public interest issues related to educational measurement. The annual lectures are jointly sponsored by ETS and an endowment fund that was established in Dr. Angoff's memory.

The William H. Angoff Lecture Series reports are published by the Policy Information Center, which was established by the ETS Board of Trustees in 1987 and charged with serving as an influential and balanced voice in American education.

Setting Performance Standards:
Content, Goals, and Individual Differences



The second annual William H. Angoff Memorial Lecture was presented at Educational Testing Service, Princeton, New Jersey, on November 6, 1995.

Bert F. Green
Johns Hopkins University

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Preface

The William H. Angoff Lecture Series Reports are the most recent addition to the roster of Policy Information Center publications.

In the 10 years since the National Council of Teachers of Mathematics (NCTM) published the oft cited *Curriculum and Evaluation Standards for School Mathematics*, much of the discussion and debate in educational reform has stemmed from one word: standards. While professional and product standards are widely accepted, educational standards are still in their infancy. Educators, parents, and policymakers across the U.S. are struggling to achieve consensus on what schools should teach and what students should know and be able to do. The quest for meaningful standards can be seen everywhere — from the burgeoning documents from various professional associations following suit with the NCTM to state-level initiatives in Kentucky and California to the national efforts to establish skills standards.

In the current report, Dr. Bert F. Green, professor of psychology at Johns Hopkins University, turns our attention to the key issues associated with the daunting task of setting performance standards. Dr. Green observes that standards are poorly understood and that the measurement community faces numerous challenges in identifying methods for standard setting. However, he argues that the primary policy problem is not how to set standards, but how many standards should be set, and on what measures should standards be set.

Drawing on the rich experiences of his work in the fields of psychometrics, statistics, cognitive psychology, artificial intelligence, and computerized adaptive testing and insights from his work on numerous advisory panels and professional associations, such as the National Assessment of Educational Progress and the American Psychological Association, Dr. Green examines the measurement issues of standard setting in terms of the broader purposes that standards serve.

I would like to thank the following individuals for their contribution to this publication: Ric Bruce designed the report; Carla Cooper provided desktop publishing services; Jim Chewning coordinated production; and Shilpi Niyogi was the editor.

Paul Barton
Director, Policy Information Center

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Preamble

I want to thank Henry Braun, and Educational Testing Service, for inviting me to deliver the annual Angoff Memorial Lecture. Choosing a relevant topic was not difficult. Almost any topic in educational measurement would reflect Bill Angoff's work, since he had a hand in so many of the technical problems of measurement. Indeed, most topics in psychology or education would be appropriate because of Bill's service and devotion to the American Psychological Association and the science it represents. Bill and I served together on the APA Council of Representatives, as representatives of the Division of Evaluation, Measurement, and Statistics. We often shook our heads at some of the antics of our colleagues. Despite our scientific conservatism, we shared an interest in developing techniques to address the new problems that measurement always faces.

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Introduction

In the inaugural Angoff memorial lecture, Bob Linn (1995) spoke about some aspects of educational standards. Today I want to talk with you about setting performance standards, an arena to which Bill Angoff contributed more than he expected. It is an area that various constituencies see quite differently, and one that causes heartburn among measurement experts. I shall also comment on content standards, and the tenuous link between content standards and performance standards, an arena that has scarcely been addressed by psychometricians. I have not contributed directly to the study of standards, but have been observing it closely, as a technical advisor to the National Assessment of Educational Progress, and as a technical advisor to the Maryland State Performance Assessment Project. I learned a lot at a joint conference on large scale assessments in 1994, especially from Michael Zieky, Samuel Livingston, and Samuel Messick.

Educational standards are always of concern to educational policymakers. There is perennial pressure for improvement. Colleges complain that the incoming students are not well-prepared. Employers complain that some high school graduates have only a slim grasp of the basics. In the 1970's, there was an upsurge of interest in doing something about standards. Most people felt that no one should be given a high school diploma without exhibiting at least minimum competency in the basic subjects of reading writing, math, and perhaps social studies. The minimum competency movement swept the country. (Jaeger, 1989). Tests of the basic skills were devised, and given to high school seniors. Cut points, or minimum competency standards were placed on the scales. To many, the demands seemed minimal indeed. Nevertheless, some students failed.

At first, the onus was placed on the students. Then students and their families complained that they had not been given an adequate opportunity to learn the required skills. Some states, such as Florida, had introduced the standards abruptly, rather than phasing them in over a span of several years. The court permitted Florida to go ahead, while the education vocabulary gained a new phrase and acronym, Opportunity To Learn (OTL) (Citron, 1983). At present, minimum competency tests are widely used and accepted. In Maryland, the tests are given as computer-based adaptive tests, and many students pass them before they enter high school, although the tests are not required until high school graduation.

Policymakers felt that the minimum competency tests would stimulate teachers and learners alike. The policy may have worked. The performance of the worst students was improved, without noticeable harm to the better students. Still, as Linn (1995) noted, there was general agreement that the minimum competency criterion led to more emphasis on the basics, and less emphasis on more advanced topics in the curriculum.

High Stakes Assessments

A new round of concern developed in the 1980's. John Cannell (1988) reported that standardized tests of achievement showed that most states were above average. Cannell named the effect after Garrison Keillor's fictional Lake Wobegon,

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where all the men are strong, all the women are good-looking, and all the children are above average.

Alas, we can't all be above average. A variety of problems were identified, including out-of-date norms, teachers teaching to the tests, and in some cases teaching the actual test items themselves. It began to dawn on educational policymakers that when stakes are high, any empirical evaluative criteria, like test scores, are vulnerable to manipulation. Sometimes, this concept is slow to be recognized. In the State of Maryland, nearly all students in the public schools were being promoted every year. The phenomenon was not the result of remarkable education, nor above-average students, but seems to stem from the practice of allotting state money to school districts on the basis of the promotion rate in the schools. That formula has recently been changed.

Just last month, the Maryland State Department of Education reported that their annual Performance Assessment in the elementary schools had been compromised. Baltimore schools' Student Assessment Service published a teachers' guide to the assessment that included a few of the actual questions from the forthcoming assessment, with a slight change of wording. Dr. Steve Ferrara, whose State office was responsible for the assessment called it a significant breach of security. Dr. Amprey, Superintendent of Baltimore Schools, called it "poor judgment." (*The Baltimore Sun*. October 21, 1995.) Similar kinds of problems have plagued educators across the country since the assessment stakes have been raised.

The current wave of excitement about improving the quality of education is built to some extent on the notion that, "If you can't beat them, join them." The strategy seems to be to build a test that represents what the students should know, so that teaching to the test becomes teaching the curriculum that is central to student achievement. If standards are set on relevant assessments, the teachers will scramble to prepare students to do well on the assessments.

Criterion-Referenced Test Scores

Cannell's jibe about too many above average students called attention to the fact that a normative scale is not really what is needed in assessing achievement. Norm-referenced tests tell us whether Susie from a rich suburban school knows more than Johnny from a poor city school. That is not really the point. What we really want to know is "What do the students know and what can they do?" This kind of question implies an absolute scale, rather than a relative scale. In psychometrics, such a scale is called criterion-referenced (Berk, 1976). Achievement assessment calls for criterion-referenced scales. In fact, these names, norm-referenced and criterion-referenced, are not totally appropriate. The difference between the two is not only in the referents for the test scales (distributions of scores for norm reference vs. content coverage for criterion reference) but in the test construction itself — performance differentiation is the main factor driving the construction of norm-referenced tests, whereas content coverage is the main factor driving the construction of criterion-referenced tests.

It sometimes seems that policymakers do not understand the distinction between criterion-referenced and norm-referenced tests. In the good old

tradition of competition, the Secretary of Education prepared a wall chart showing, among other things, average SAT scores for each of several states. Technically, this is an outrageous misuse of SAT scores (Wainer, Holland, Swinton & Wang, 1985; Wainer, 1986). The SAT is designed to be norm-referenced. Its purpose is to differentiate among students bound for those colleges that require SAT scores. The SAT is in no sense an achievement test, even though it measures verbal and quantitative abilities that have been developed and expanded in school.

The National Assessment of Educational Progress (NAEP) improved upon the wall chart by conducting a state-by-state assessment of mathematics achievement, using a criterion-referenced measure. This provided a more reasonable way of obtaining comparisons between states. Still, comparing achievement in one state with that in another state does not seem to be very enlightening. States should be interested in what their students know, not in whether their students know more than the students in other states. The recent rash of international assessments seems likewise designed to show that the United States students are not number one. At the local level, school administrators tell me that they observe great interest in school improvement on the part of real estate agents, who are probably seeking a comparative advantage.

Elements of Performance Standards

The term "standards" is used in so many ways in education and testing that it sometimes seems that we aren't even talking about the same concept. In order to sort out this melange, it may be helpful first to consider the elements that go into a performance standard, and then to consider how those elements apply to performance standards that are used for different purposes. The discussion will be confined to standards applied to people, or groups of people, rather than standards for products like electric wiring, or vacuum cleaners.

In setting performance standards for students, one must first have a scale on which to set it. Perhaps standards could be set without a scale, but that seldom happens in education. The only alternative is a list. Standards for products are generally lists. One such list is the *Standards for Educational and Psychological Testing and Assessment*, prepared jointly by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education (1985). Tests are expected to live up to each one of those standards. Sometimes shortcomings in one area might be ignored because of good performance in other areas, but that is not the intent of the standards. There are, of course, no sanctions for tests that don't meet the standards.

But, except for lists, performance standards are set on score scales. The choice of the test or tests is critical. Is the test to be built mainly for differentiation, or is it to be a criterion-referenced test, built mainly to represent the content domain? Nearly always, a criterion-referenced test is needed. There is then the question of how to specify the content

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that the test is to cover. This involves content standards, which will be considered later.

Next, is there to be one standard on a scale, as in minimum competency, or should other levels of competency be recognized? That is, should the grade be pass-fail, or should it be A, B, C, D. There are many circumstances in which several levels would be useful.

Is one scale enough, or is there so much variety of content that several scales should be used? If there are several scales, is the standard to be an overall standard, obtained from some combination of scale scores, or should there be a standard on each scale, and some rule for an overall decision. In high school tests of minimum competency, for example, there is a minimum standard for each of several key subjects. The student usually must pass each subject.

Finally, how shall the cut-point actually be determined? There are some sophisticated methods for setting standards, the most popular of which is the so-called Angoff method. The term "so-called" is appropriate because Bill described that method offhandedly, and mainly in a footnote, in the classic, *Scales, Norms, and Equivalent Scores* (Angoff, 1971). In this procedure, each of a set of expert judges is asked to imagine a person whose skill is just at the borderline between acceptable and unacceptable, and then to mark the exam as that person would have marked it. The average score of the papers marked by all the experts is then taken as the cut-point or performance standard. The main problem is getting judges to agree about what is meant by a person at the borderline.

The Angoff method has some variants. Each judge can be asked to indicate, for each test item, how likely it is that the borderline person would give the correct answer. Critics say that this amounts to asking people to judge probabilities, a task that they can't do very well. But the responses can be rescaled for maximum interjudge agreement; the actual probabilities don't have to be believed for the method to work.

Instead of imagining a marginally competent person, Michael Zieky and Samuel Livingston of ETS point out that it would also be possible to assemble a group of real people who were marginally competent, and to find out how they did on the test. Another scheme is called the contrasting group method. A group of well qualified professionals, and a group of aspirants who are clearly not qualified, are both given the exam. The cut point is set so as to best discriminate between the two groups.

There are also some not-so-sophisticated methods in regular use. For example, norms are sometimes used as standards. That may seem arbitrary, but it happens. Course grades, for example. Course grades in school and college are a species of performance standard. Teachers sometimes grade on the curve (norm referenced), or else they assign grades based on their own and their schools' standards (criterion-referenced). It is not always easy to know what grades mean. I shall always remember a Shakespeare course I took at Yale, when I briefly thought I would major in English. I did not understand very much of the seminar discussion, but I did OK on the biweekly papers, or so I thought until I showed one of my graded papers to a classmate who exclaimed, "B+ ! That's the lowest grade anyone has gotten on a paper this semester." I quickly converted to a math major.

Purposes Of Performance Standards

The choices for the elements of a particular standard depend to a large extent on the purposes that standards are intended to serve. They can be used in certification, such as when minimum competency tests are used to certify a high school graduate. Standards can also be used as predictors, such as when standards are set on entrance exams for college or for employment. Standards may serve merely as descriptors. And finally, standards can be used as motivators.

Standards as Certifiers

Minimum competency tests and the many professional certification exams — like the actuarial exams, the certified public accountant exams, bar exams for attorneys, and medical board exams — are designed to establish competence. These tests are intended to be criterion-referenced, in the sense that their main purpose is to represent the relevant content. There might also some consideration of testing method. An architect should be asked to design something. A surgeon would seem to need to display actual hands-on performance, as well as job knowledge, but perhaps a portfolio of patients could be submitted.

One cut-point would seem enough. A person is, or is not, certifiable, as in the case of a minimum-competency exam. But often several scales are involved. The high school student must demonstrate competence in several areas. Almost all professional certification exams involve tests in several areas. The main question for certification examinations is how many different scales are to be assessed, and how the results are to be combined. Sometimes the different areas are sufficiently correlated that a single overall score can be obtained by some kind of weighted or unweighted average. A history achievement test might include American history and world history in some proportion, and vast knowledge of one can compensate for little knowledge of the other. More often, separate standards are set on each scale. A C.P.A. needs to be adequately adept at business law and ethics, auditing, business accounting, and non-business accounting. Each of four exams must be passed, within three years. The actuaries had, when I started taking the series, eight exams, which all had to be passed, but over an extended time span.

In practice, certification standards are often set without benefit of psychometrics. One certification exam has a mandated passing grade of 70% of the items. However, adjustments are made so that 30% of the candidates pass. Similar methods are used in a number of specialty exams. Passing grades on bar exams are frequently set by this percentage method, but the percentage varies a little, from year to year, depending on how many new lawyers are needed that year.

Standards as Predictors

Standards are often used for college entrance or employment tests. For example, a college academic department might believe that a student who scores less than 500 on any section of the Graduate Record Examination General Test is unlikely to make the grade in graduate school. In such situations, it is

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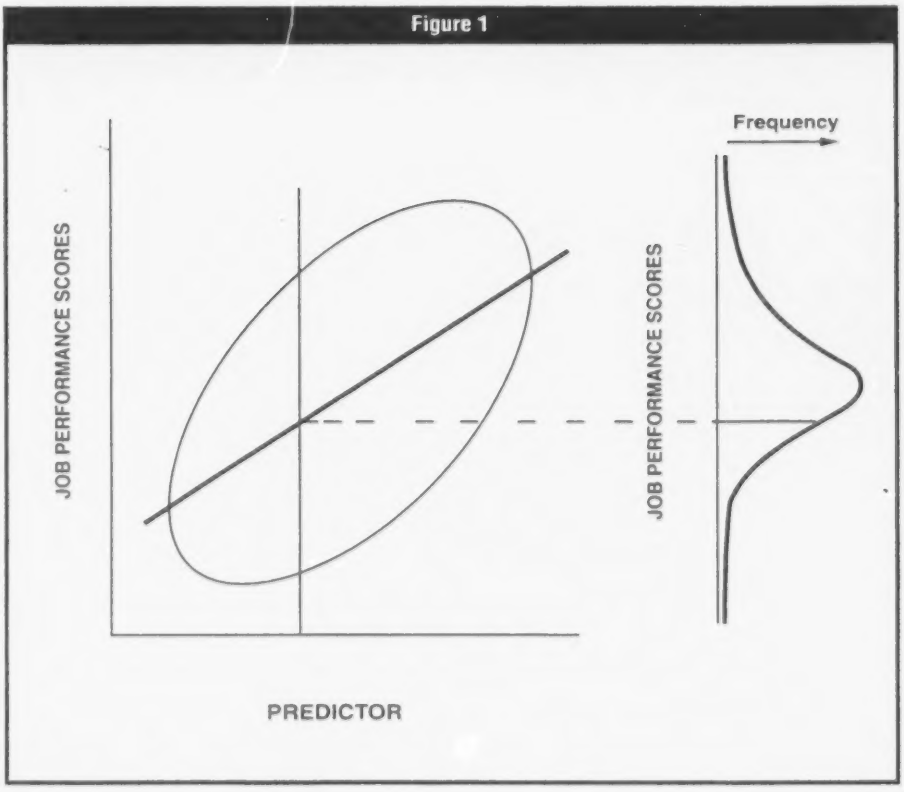
important to set the standard on the right scale. Sometimes the Angoff method is used to set cut-offs on the predictor of success, the test. Judges are asked to estimate the probability that a successful worker, or a successful student, would correctly answer each item on the selection test. That is an incorrect application of the methodology. The judgments are on the wrong continuum.

In a prediction situation, the standard should first be set on the criterion. When predicting job performance, it is job performance that should be dichotomized. In predicting academic success in college, it is college grade point average (g.p.a.) on which standards should be set. First we locate the criterion point that separates the successes from the failures, then we need to locate the cut point, i.e., the value that predicts that criterion cut point. For example, the cut point on the predictor could simply be the score for which the person is predicted to have a 50-50 chance of success. Figure 1 depicts this situation. It is important to notice that when the implied cut-point on the predictor is then applied, the result is not a sharp break in the criterion distribution, because of the errors in prediction, as shown in Figure 2.

The choice of elements for the standards then applies to the criterion, not to the tests or other predictors. There is usually only one criterion. When there are several criteria, one criterion is usually primary. In college entrance that is academic success. For example, at Johns Hopkins, being a good lacrosse player counts for a lot, but the applicant still must be able to avoid academic probation.

Sometimes, success is predicted from a combination of several test scores and other indicators,

Figure 1



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and there is no reasonable way to use the Angoff method on a regression composite.

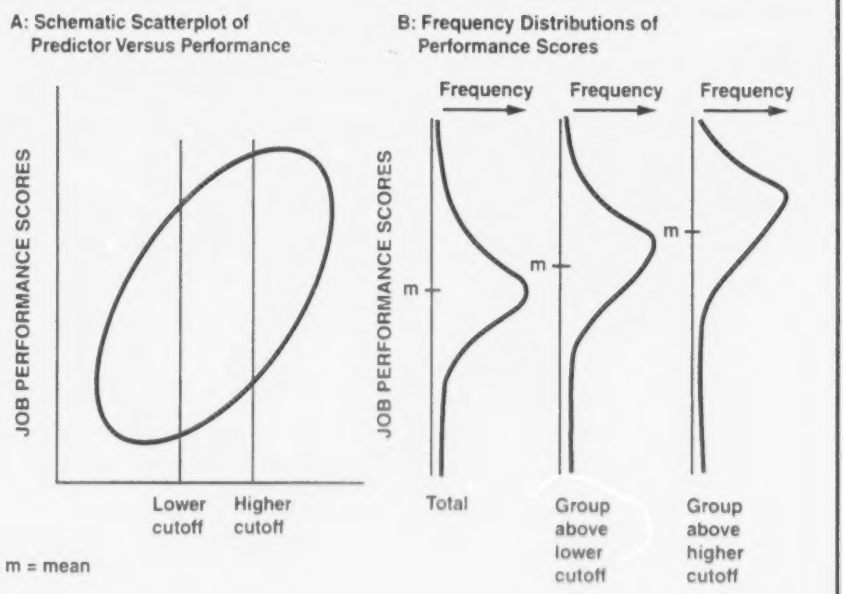
Once the cut-point is set on the criterion, say freshman g.p.a., then it is possible to determine what value of the [composite] predictor yields the requisite probability of success. But then, no cut points are implied on the individual predictors, since in a regression, the predictors are combined in a compensatory way.

One example of a regression composite can be found in the process the National Collegiate Athletic Association (NCAA) uses to set a minimum standard for participation in college athletics (NCES, 1995). This year, the standard for eligibility for participation in college athletics programs applies not only to the entrance tests but also to the high school g.p.a. Moreover, the description of the decision rule is compensatory: if you have lower test scores, you need a higher g.p.a.; if you have a lower g.p.a., you need higher test scores. The standard can be represented as a line in the graph of the predictors, and can also be represented by a table, as shown in Table 1.

For the past decade, I have been working on various personnel testing projects for the U.S. armed forces. In the U.S. Military, applicants must pass a cut point on the Armed Forces Qualification Test (AFQT) to qualify for entrance. Then for each potential military job, there is a second, job-specific standard on some combination of the 10 tests in the Armed Services Vocational Aptitude Battery (ASVAB). Persons who can just barely qualify for entrance often can qualify for only a few of the hundreds of military specialties.

Between 1982 and 1992, the U.S. Military conducted a long project to establish stan-

Figure 2



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dards based on actual hands-on performance (Wigdor & Green, 1991). Rather than attending to how well the incumbents had done in training school, the standards were based on how well they could do their job. Moreover, in some cases it was possible to get judgments from supervisors of the value of various performance levels. In some instances, poor performance while not valuable, is also not threatening, whereas in other jobs, poor performance can be dangerous to the incumbent; in some jobs, poor performance can pose a serious danger to others. Poor performance by a cook may result in disgruntled colleagues; poor performance by an air traffic controller may result in dead colleagues.

As one looks at the problem of recruiting service personnel and placing them in jobs, the issues of performance value and performance cost must be weighed. Not only are highly talented individuals in short supply, but they are in demand. Civilian companies want to hire them too. Most of them would go to college if they could afford to, so the Army has instituted a signing bonus: in return for a full tour of duty, the Army will provide money for college tuition. This is an expensive program, and there have been attempts to consider just how much good performance the military can afford. There are costs of various sorts associated with both good and poor performance. Obtaining good performance means paying bonuses for signing up; poor performance can be dangerous, but what mounts up is the cost of recruiting someone who can't make it through specialty school, or who resigns, or is fired before they contribute much to the organization.

The U. S. Military now has an econometric model that computes the costs involved in setting particular standards (Green & Mavor, 1994). But

Table 1

Minimum Standards for Eligibility for Participation in Division I College Athletics (abridged from NCES, 1995)

*Core GPA**	*SAT*	*or*	*ACT*
2.5 or Above	700		17
2.4	740		18
2.3	780		19
2.2	820		20
2.1	860		21
2.0	900		21

*Core GPA has a detailed definition in terms of course requirements.

standards are not the main focus of the model. In a large organization like the U. S. Military, many other jobs also need recruits. The jobs are in competition with each other for the available talent, and talented applicants are in short supply. If some jobs got many of the recruits with great promise, the other jobs would have to settle for second best. In order to try to parcel the talent equitably, each job, or each class of jobs establishes a goal of expected performance, expressed as a distribution. It is openly recognized that all new incumbents are not going to develop into experts, but there is plenty of work for journeymen. Even if most eventually became superior workers, there is always movement into the job from new hires, and exodus due to promotion and attrition, which in the case of Military, includes finishing a contracted tour of duty with no interest by the employer or the employee in signing a new contract. So for all these reasons, as well as the inevitable individual differences, the quality of job performance among incumbents at any moment is best described as a distribution. That distribution becomes a goal for the current recruiting effort. If it is decided to raise the goal, by raising the mean of the expected performance distribution, then there will be cost implications. More effort will have to go into recruiting. Moreover, raising the goal in one job means draining talent from other jobs, unless the means of their desired performance distributions are also raised. So a system of balancing has to be used. The econometric model recognizes the need for balance. The model can also address the "down-sizing" economic question: How will performance suffer if the recruiting budget is lowered?

Note that our standards for prediction have changed into performance goals, and that the goals are expressed as distributions. Setting cut points on the-entrance tests has been done indirectly by setting performance standards. Each job has an entrance standard, but it is of marginal interest. The main interest is the whole distribution, which could be specified by assigning percentages above various points ordered along the performance continuum. Some of us tried unsuccessfully to promote the use of such points, to distinguish categories of job performance (novice, apprentice, journeyman, master, and expert).

Standards as Descriptors

The simplest use of standards is to clarify the meaning of a scale. That was the point of suggesting the categories of job performance. When a scale is being used for some kind of individual or system-wide evaluation, the meaning of various points on the scale need clarification. An excellent example is the NAEP scales, as described by the NAEP proficiency levels, also known as anchor points, developed in the mid 1980's (Beaton & Zwick, 1992).

NAEP assesses several achievement areas: reading, writing, math, science, and occasionally some other areas. There is a NAEP scale for each area. Each scale is centered at 250, and ranges from 0 to 500. Some points were selected as anchor points, also called proficiency levels, and descriptive phrases were developed in order to characterize the skills represented by each level. As an example, Table 2 shows the mathematics proficiency descriptors. These descriptors were developed by examining the items

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that were generally answered correctly by most of the persons below the level, and by few of the persons above that level.

The NAEP scales are developmental, in the sense that one scale is used to describe the progress of students through the first 12 years of school. There are discussions about whether the scale is really measuring the same thing at lower score levels as it does at the higher levels, but that is not the issue today. The point here is that the proficiency levels are descriptors. Standards could be set for the system by aiming for a distribution of 17 year olds as 100% at level 200, 90 % at or above 250, 60% at or above 300, and 20% at or above 350. These would be goals to aspire to, not really likely to be met soon, without incredible change in the educational system. Nevertheless, they would constitute standards for the system. It would be almost as good to set the standard in terms of the mean and standard deviation of the proficiency distribution, but such a specification would not be so easily understood by the general public.

Since the levels are being used as descriptors, it doesn't much matter which points are chosen, nor how many. There should be enough points, well-spaced along the scale, but four or six would have done about as well. The important methodological point is that when standards are used as descriptors, one can pick the points first, and then find appropriate descriptions by examining the item information.

There has been a recent uproar about NAEP standards because of a change called for by a new National Assessment Governing Board (NAGB). This new board was appointed a few years ago, in the midst of a national cry for educational improvement. Employers moaned that high school graduates

Table 2

Percentages of Students Performing at or Above Mathematics Proficiency Levels: 1986

Level	*Description*	*Age 9*	*Age 13*	*Age 17*
350	Can solve multi-step problems and use basic algebra	0.0	0.4	6.4
300	Can compute with decimals, fractions, and percents; recognize geometric figures; and solve simple equations; and use moderately complex reasoning	0.6	15.9	51.1
250	Can add, subtract, multiply and divide using whole numbers, and solve one-step problems	20.8	73.1	96.0
200	Can add and subtract two-digit numbers and recognize relationships among coins	73.9	98.5	99.9
150	Knows some basic addition and subtraction facts	97.8	100.0	100.0

standards. Methods of setting performance standards assume that the test adequately reflects the domain of knowledge on which the test-takers are being evaluated. A prior step would seem to be to define the domain.

The performance standards have to reflect the content standards. The bridge from the content standards to the performance standards depends on the test specifications, the item writers and test editors, and on the resulting performance measurement scale. Logically, it would seem preferable for the judges to set standards first on the content domain. They could identify what parts of the domain are basic, what parts go with proficient persons, and what parts would mainly be mastered by advanced students. It is not at all clear how to do this, but a way might be found. Judges might also be useful in evaluating the bridge from content to performance. This would seem a more straightforward task than imagining the test behavior of marginally competent test-takers.

NAEP has used what they called frameworks to delineate the assessment content. Forsyth (1991) criticized the NAEP anchor point descriptions primarily because the link back to the frameworks was unclear. He felt that even if the anchor points were adequately described by certain items, it was still necessary to show that the items adequately represented their framework. The NAEP frameworks are cross-classified by subject knowledge and levels of understanding. For example, the Reading framework (Table 3) is a matrix. The number of items representing each cell can be counted. The framework for the new mathematics assessment is more complex, consisting of five broad content strands, three mathematical abilities, and three unifying themes (Figure 3). An item might represent more than one aspect of this multi-way frame

Table 3

NAEP Reading Proficiency Levels

350	Can synthesize and learn from specialized reading materials
300	Can find, understand, summarize, and explain relatively complicated information
250	Can search for specific information, interrelate ideas, and make generalizations
200	Can comprehend specific or sequentially related material
150	Can carry out simple, discrete reading tasks

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couldn't do much, and scholars interested in cross-cultural comparisons pointed out that United States students were not Number 1; far from it. So NAGB decided to set standards in terms of a new set of generic levels on the scales, which were called achievement levels, and were named Basic, Proficient, and Advanced (NAEP, 1993; Lissitz & Borque, 1995). That is, rather than picking the points first, and then characterizing them, they picked the names first, and then tried to find out where their new labels belonged on the scales. That has turned out to have been ill-advised. My colleague, Warren Torgerson, says that asking someone to place "Proficient" on a test score scale is like asking someone draw a "moderately long line" on a sheet of paper. There are bound to be different notions of what the labels mean. Moreover, any method that is used to find locations for the labels on the scale had better do all the labels at once, rather than one at a time, lest proficient turns out to be placed higher than advanced. That actually happened once or twice, according to hearsay. Moreover, the implication that Basic in mathematics means roughly the same as Basic on writing is no more than a suggestion.

Standards as Motivators

The main reason for setting high standards for educational achievement is partly for assessment, and partly for motivation. Teachers are being encouraged to raise the achievement distribution of their students. The standards are goals again. Those who set the goals must recognize that some students will be better than others. Individual differences are inevitable. The standards should provide goals for all students. The NAGB did so when it chose to have three standards, leading to four regions of the achievement dimension: Unsatisfactory, Basic, Proficient, and Advanced. Perhaps everyone should be expected to reach at least a basic level, but there will always be some for whom Basic is in itself a notable achievement. Others could easily become proficient, and some should be expected to reach expert status and beyond. (This seems not very different from the classic A, B, C, D).

In the context of goals, almost any levels would serve. The goal for the system could just as well be specified in terms of the proportions of students expected to be in the various categories. In that case, roughly any categories would do—they are only being used as descriptors. In particular, the NAGB could have used the NAEP anchor points. There was no need to shift to another set of points, and no need at all to try to locate those arbitrary points empirically. Of course, NAGB and NAEP are aiming only at the system level. Some states are aiming at the student level—i.e., using an assessment that is long enough to provide students some feedback about the quality of their individual performance. At the individual level, accessible goals are needed for all students.

Content Standards

As noted above, there is an important distinction between content standards, which define the extent of the domain to be tested, and performance standards, which indicate how much of the domain has been mastered. Messick (1994) has recently argued that the bridge from the one to the other is of central importance in validating performance

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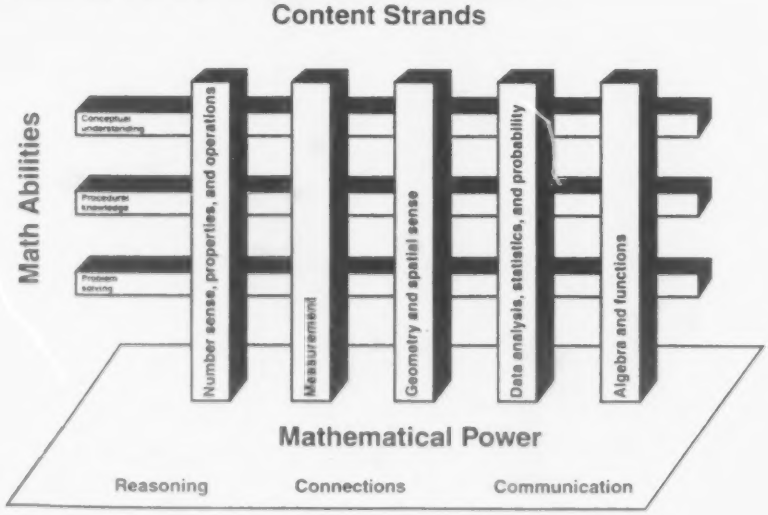
The bridge from such content standards to performance standards is complex (Lane, 1993).

As many of you know, various groups of educators have been devising a new round of content specifications for what students should know about their given area. The mathematics standards have been published (National Research Council Mathematics Sciences Education Board, 1993.), and some science standards are on the way. These standards are not designed to facilitate measurement. They are standards for the curriculum, not the assessment. Indeed some of these groups do not place a high value on tests. The mathematics standards opens with a quote from an Iowa farmer, "You can't fatten a hog by weighing it." One possible reply would be, "You can't tell about the feed without weighing the hog." Despite this brilliant repartee, we can be sure that the content standards are not stated in a manner that leads in any direct way to content specs for tests. Moreover, the current wave of content standards appear to be focused on expert performance. The goal is deep thought, and expert problem solving. Not everyone can be an expert. Everyone can be good at something, but most of us get along without being proficient in everything.

Figure 3

Dimensions of the 1994 NAEP Mathematics Assessment



SOURCE: U.S. Department of Education, National Center for Education Statistics, National Assessment Governing Board. *Mathematics Framework for the National Assessment of Educational Progress.* Washington, DC: 1994.

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Conclusion

In summary, the psychometric problem of determining just where a cut-point should be placed on a scale seems not to be a central feature of standard setting. Cut points are important in certification, but so are deciding what to test and how to test it. In prediction, placing the standard on the right scale is important. For description and for motivation, the placement of the points is less important than having enough points to serve as descriptions and goals for the full range. And finally, finding a way to map content standards onto performance standards is a challenge.

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ETS POLICY NOTES

News from the ETS Policy Information Center

Volume 7, Number 1 · Educational Testing Service, Princeton, New Jersey · Summer 1996

Literacy: Economic Key for the New Millennium

Recent developments such as NAFTA and the Maastricht Treaty, which established the European market, have opened the doors to world trade. Globalization is not new, but until now shifts in the relative comparative advantage of nations have occurred slowly and gradually. As the new millennium approaches, major shifts that influence the competitiveness of nations are likely to occur much more quickly.

Certain countries, firms, and individuals are well positioned to compete successfully in global markets; others may have difficulty taking advantage of the opportunities. A massive reallocation of labor is expected to occur as Organization for Economic Cooperation and Development (OECD) countries try to adapt and maintain their economic positions.

Traditional job and career patterns are dissolving as the knowledge content of jobs evolves and the need for low-skill workers fades. As businesses and labor markets change, some jobs become obsolete and new ones, likely requiring more literate workers, are created. In this environment of change people will need to be prepared to change jobs, perhaps many times. Thus, lifelong learning and literacy become key.

Lifelong learning is an important means of acquiring new competencies and qualifications, but adequate foundation skills are critical. Governments can no longer rely on policies of expanding school enrollments and improving educational systems to meet the demands of new and high-level competencies generated by the economy. Because literacy has an effect on the ability of workers to learn efficiently and to be flexible in learning, it also has an effect on the rate at which a culture of lifelong learning can be realized. For some, it is the sine qua non of workplace learning.

According to the OECD, the best way of exploiting the new economic environment is to strengthen the capacity of businesses and labor markets to adjust to change, improve their productivity, and capitalize on innovation. But these capacities depend first and foremost on the knowledge and skills of the population. People are the key resource and their level of literacy is a powerful determinant of a country's innovative and adaptive capacity.

Cultivating and developing literacy should be an important element in every country's long-term policy strategies. Systematic knowledge about the dimensions and levels of literacy and sound information about its distribution in the population are prerequisites for forming good policy. The International Adult Literacy Survey (IALS), which is summarized in this issue of *ETS Policy Notes*, was an effort to begin providing such information.

This Issue: International Adult Literacy

- Literacy: Economic Key for the New Millennium
- Distribution of Literacy and Related Factors
- The Practices of Literacy
- Conclusions

Editor's Note: This issue of *ETS Policy Notes* is a condensation of *Literacy, Economy and Society: Results of the First International Adult Literacy Survey*, published by the Organization for Economic Cooperation and Development and Statistics Canada. Unless otherwise noted, all data are drawn from that report. Copies can be ordered for $40 from:

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The Distribution of Literacy and Related Factors

The countries involved in the IALS differ in their demographic makeup, their educational systems, and their employment opportunities. Thus, it was not the purpose of the IALS to rank literacy skills across countries. It is instructive, however, to explore the differences among countries with respect to literacy measures and to examine factors related to literacy skills. These factors include those that lead to literacy, such as education, and those that might be thought of as consequences of literacy, such as income and occupation. This section of the newsletter describes the distribution of literacy — prose, document, and quantitative — in the participating countries and illustrates the relationship between literacy and these other factors.

Results

Figure 1 shows the distribution of literacy in each participating country. The graphs present the estimated percentage of each country's population at each level on each of the three literacy scales.[1]

Some interesting findings include:

- Canada and the United States have quite similar distribution patterns, though the United States has a slightly larger proportion of its population at Level 1. What distinguishes both countries is that both have relatively large percentages of their population at Level 1 and at Level 4/5. In both countries, there are larger proportions of the population at Level 1 on the document scale than at Level 1 on the other two scales. Likewise, Canada has larger percentages of its population at Level 4/5 on the document scale than on the prose and quantitative scales, while the United States has smaller percentages at Level 4/5 on the document scale than on the other two scales.
- Germany demonstrates considerable variation across scales, particularly when comparing the proportion of its population at Level 4/5 on the prose scale with the percentage of the population at Level 4/5 on the quantitative scale.
- The Netherlands shows great internal consistency across scales, with an especially large percentage at Level 3 on all three scales. As in Germany, the percentage at Level 4/5 on the prose scale is smaller than the percentage at this level on the other two scales.
- Sweden has substantial proportions of its population in each of the higher levels on all three scales.
- The two language groups in Switzerland (French and German) show few differences. There are substantial percentages at Level 3 on all three scales, and there is a large proportion at the higher levels on the quantitative scale. In this way, Switzerland is similar to the Netherlands and Germany.

Employment

In all the participating countries, employment is positively related to literacy — those employed are more likely to be at a higher literacy level than those who are unemployed. In all eight countries, a very small percentage of individuals at Levels 3 and 4/5 find themselves unemployed, while a large proportion of those at Level 1 are without work. The proportion at Level 1 who are unemployed is comparatively large in Germany, Sweden, and Poland. These data show clearly that literacy and employment are strongly linked.

[1]Literacy is defined in terms of three domains — prose, document, and quantitative. In each of the three domains, a scale from 0 to 500 was constructed. For analytical purposes it is useful to group people into five levels of literacy, corresponding to ranges of scores achieved (e.g., Level 1, the lowest literacy level, includes scores from 0 to 225). Because the proportion at Level 5 is under 5 percent in most countries, Levels 4 and 5 have been combined in the IALS report.

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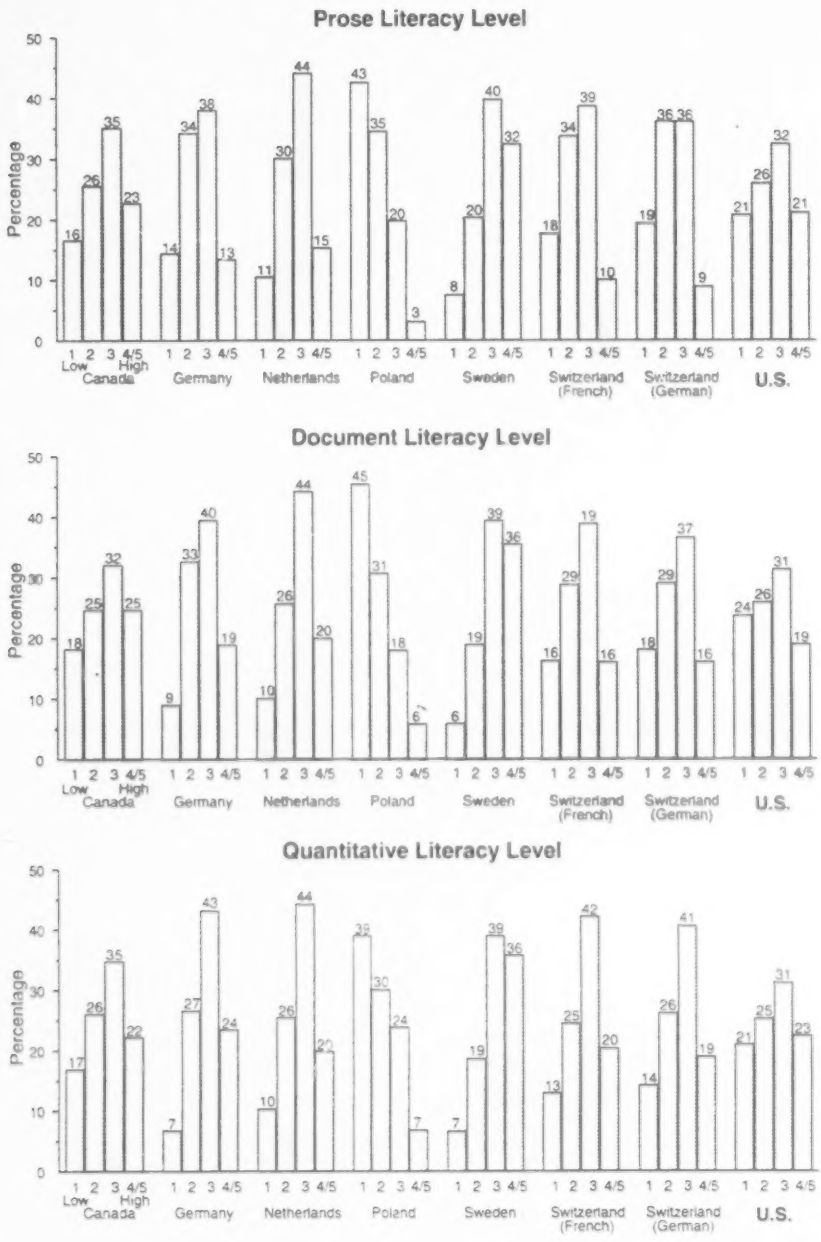
Figure 1. Distribution of Population by Literacy Level - Prose, Document, and Quantitative Scales



Income

In all the countries there is a clear direct effect of literacy on wage income. Individuals at Level 1 are much more likely than those at other skill levels to have no income. At the same time, those at Level 4/5 are more likely to be in the high-income group. But it is also important to point out that individuals performing at Level 3 are also likely to have relatively high incomes.

Occupation

There is a consistent and expected relationship between literacy and occupation, and there are also some interesting differences across the scales for particular occupations.

- ***Manager/Professional*** is predominantly a high-skill group with 60 to 75 percent at Levels 3 and 4/5. This group usually does better on the document and quantitative scales, compared to the prose scale.

- ***Technician*** is also a high-skill occupation, although there are more technicians than managers and professionals at Level 2, and fewer technicians at Level 4/5.

- ***Clerks*** display higher literacy skills than those shown by other occupations with similar educational qualifications, such as sales, service, skilled craft workers, and machine operators. However, the largest proportion of clerks are at Levels 2 and

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3, not at Level 4/5, suggesting that the highest level of literacy skill is not required for the kind of tasks clerks regularly perform.

- ***Sales and Service*** workers are probably the most heterogeneous group — there are usually some of these workers at each literacy level; and in some countries there are significant proportions in Level 4/5.

- ***Skilled Craft*** workers show noticeable differences from country to country. In the United States and Canada, between 25 and 30 percent are at Level 1 on the document scale, but in Germany only 7 percent are at this level. Entry into craft occupations in North America is relatively easy and unregulated, in contrast to Europe, where these occupations are usually subject to more rigorous entry requirements and/or certification based on demonstrated skill.

- ***Machine Operators*** have skill levels similar to those of skilled craft workers when the latter are relatively low-skilled (as in North America). However, they have lower skill levels when craft work is subject to certification (as in Germany). In particular, machine operators tend to have lower skills on the quantitative and document scales than on the prose scale.

- ***Agricultural and Primary*** occupations have the lowest demonstrated literacy skills. This is particularly noticeable in countries with larger agricultural sectors, such as Poland.

Industry

There is an interesting and important relationship between literacy and changes in employment opportunity within different types of industries. In participating countries, those industries that have grown in the last 20 years, such as financial and personal services, are those where the incumbents have the highest average scores. At the same time, industries in decline, especially agriculture, are characterized by workers with the lowest average literacy skill. The IALS data document the growth in skill demand in the changing industrial economies.

Reserve Labor Force

For an economy to grow there should be a source of skilled workers to fill the jobs in the growth industries. Sources include students leaving school, the unemployed, and those out of the workforce who might be attracted back in. In every country large proportions of this group are at Level 1, and in many countries the percentage of the reserve force at Level 4/5 is about the same as the percentage of unemployed at that level; Sweden is the notable exception. In certain countries, a large proportion of the population outside the labor force is at Level 3 (Germany and the German-speaking group in Switzerland have over 40 percent at this level), suggesting that these countries do have a resource that might be available if conditions were right. Canada, the United States, and Poland would seem to have the smallest reserve resource; in all three countries, over 30 percent of this group is at Level 1.

Full-time Versus Part-time Work

Part-time workers can be a potential source of skilled workers if they are not less skilled than full-time workers. There is no systematic relationship between literacy skill and whether an individual is employed full- or part-time. On some scales, in some countries, full-time workers have slightly larger proportions at the higher skill levels; on the other scales, often in the same country, there are also large proportions of part-time workers at the higher skill levels. There are two possible reasons for this. First, many part-time workers may be students. Second, child care or other family responsibilities may limit working hours.

Adult and Continuing Education

The data point to considerable similarity between countries both in terms of the proportion of the

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workforce that receives training and in the way training is distributed by literacy skill. Poland is a clear exception — the proportion reporting having received any training is notably small. With the exception of Poland, the more skilled a person is, the more likely he or she has had some training. The majority of those at Level 4/5 had some training opportunity; only in Sweden did those at Level 1 have similar training opportunities.

Immigration

With the exception of Canada, immigrants account for higher proportions at Level 1 and lower proportions at Level 4/5. In Switzerland and the United States, immigrants are more likely to have lower educational attainment than those born in the country, but proportions with low levels of education are similar for both native-born and foreign-born residents in Germany, the Netherlands, and Sweden. At the same time, there is little difference in any of these countries between immigrants and native-born residents in the proportion with tertiary education. In these cases, other explanations, such as language or culture, are necessary.

Education

Because the IALS countries have quite different patterns of educational attainment, it should be expected that these differences play some role in the differences in literacy, since there is a strong relationship between education and literacy. But education is not, by itself, a satisfactory or simple proxy for literacy. Not only does every country have some proportion of its least-educated population at Level 3 and Level 4/5 on each literacy scale (and some of its most educated at Level 1), but the relationship between education and literacy is not the same in every country and not the same from scale to scale. Thus, comparisons based solely on educational attainment may incorrectly estimate true skill differences.

Parent Education

While there is a relationship between parent education and tested literacy, that relationship is not the same in all cases. For example, more Canadians than Germans whose parents have relatively low levels of education nonetheless attain Level 4/5. It is also worthwhile noting that the IALS countries are quite varied in parents' education.

Age

Education is not only distributed differently among the countries, but it is also distributed differently by age within each country. Literacy is related to age independently of education as well. The relationship between age and literacy is slightly more complex than the relationship between education and literacy. In all countries except the United States, at older ages, the proportion at Level 1 is larger on all three scales. It is generally the case that fewer — in many cases significantly fewer — young adults are at the lowest level on any scale. This does not mean, however, that proportionately more young adults are at Level 4/5. The mixed results seen in these data demonstrate that adult literacy is a result not just of school experience, but also of life experience. This implies that the IALS results are not an appropriate measure of school effectiveness, but rather a measure of the culture of literacy in a particular society. It is safe to say that in all countries the proportion of young adults who will be entering the workforce, on average, have notably higher skill levels than older workers who will be retiring.

Gender

The data show that there is a gender effect, small in some countries, large in others, but that effect is not the same on all the scales or for all countries. In general, as one moves across prose to document to quantitative scales, men's scores increase relative to women's. In some countries, women's scores decrease through this progression of scales, but even when they do increase they do so more slowly than those of men. The predominant explanation for these differences points to different patterns of course enrollments in school.

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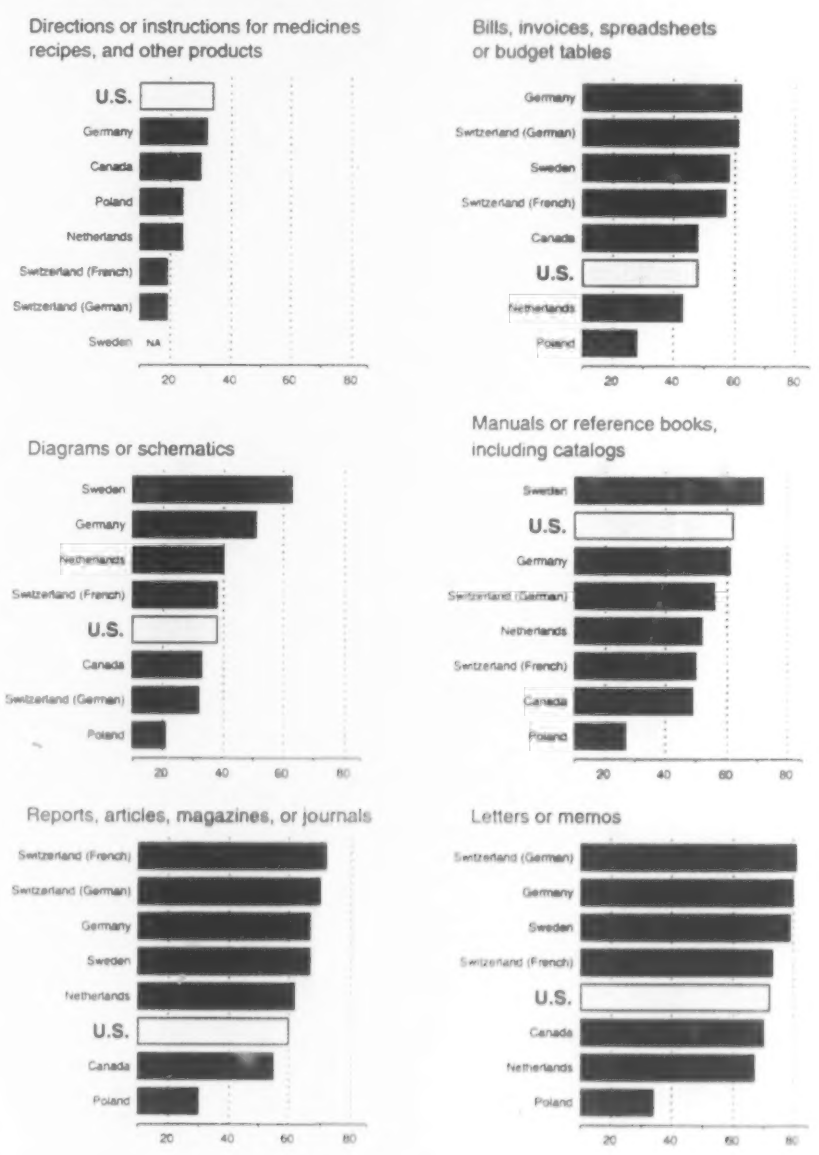
The Practices of Literacy

The IALS collected a broad range of information about the literacy practices and other daily activities of the respondents and provided new insights into the differences in the distribution of literacy within and among participating countries. This article discusses literacy practices at work and in the community. Bar charts show the overall frequency for each literacy activity across the participating countries. Within each section, the relationship between literacy level and both literacy activity and occupation is briefly discussed.

In general, there are differences among the countries in the frequencies reported for the different literacy tasks, but these differences are mostly consistent from task to task. Swedish respondents almost always reported the most frequent use of literacy tasks at work and Polish respondents the least frequent.

These differences reflect the countries' different occupational distributions. In general, respondents in Poland reported using all the literacy skills the least, and this country — at least among the survey countries — has the largest proportion of workers in the occupations requiring the fewest literacy skills: agriculture and other primary occupations. At the same time, Poland recorded the smallest proportions in the occupations requiring the most

Figure 2. Proportion of Population in Each Country Who Reported Engaging in Various Workplace Reading Tasks at Least Once a Week



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frequent use of literacy: managers, technicians, and clerks.

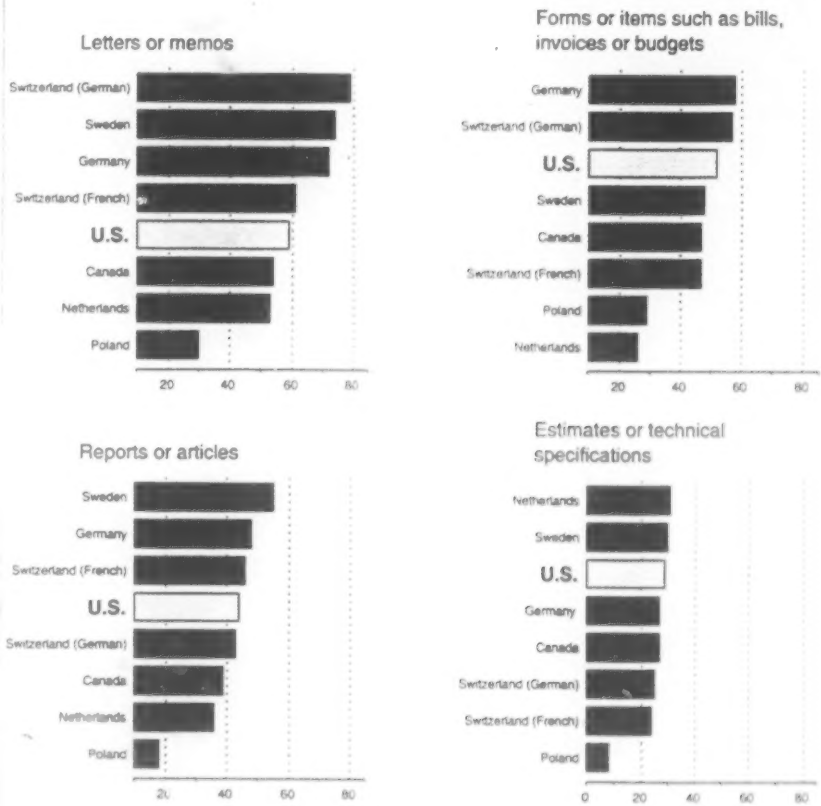
Literacy at Work

Reading. Respondents were asked how frequently they read or used information from six types of texts as part of their job — directions or instructions for medicines, recipes, and other products; bills, invoices, spreadsheets, or budget tables; diagrams or schematics; manuals or reference books, including catalogs; reports, articles, magazines, or journals; and letters or memos. The proportion of the population in each participating country who reported engaging in these workplace reading tasks at least once a week is shown in Figure 2.

There is a general tendency, across countries, scales, and tasks, for individuals at higher literacy skill levels to report that they carry out a practice more frequently. For example, in Poland only 18 percent of those at Level 1 on the document scale reported reading directions at least once a week, but 46 percent of those at Level 4/5 reported doing so. The differences are even larger for tasks that are likely to involve more complex texts, such as using manuals and reference books.

The frequency of reading tasks varies by occupation, as should be expected. In French-speaking Switzerland, for example, 83 percent of the clerks reported reading memos and letters at least once a week, but only 54 percent of the skilled craft workers said they read those materials that frequently. Also in French-speaking Switzerland, 68 percent of clerks reported working with bills or invoices weekly, while 55 percent of the technicians said that they did. In contrast, 42 percent of the technicians, compared with 23 percent of the clerks, reported using schematics and diagrams this often. Overall, the occupational category with the highest reported frequencies across tasks is the professional/management group. Clerks and technicians reported the second most frequent use for many tasks.

Figure 3. Proportion of Population in Each Country Who Reported Engaging in Each of Several Workplace Writing Tasks at Least Once a Week



Writing. Respondents were asked how often they wrote or filled out four types of text as part of their job — letters or memos; forms or items such as bills, invoices, or budgets; reports or articles; and estimates or technical specifications. Overall frequencies for each country are shown in Figure 3.

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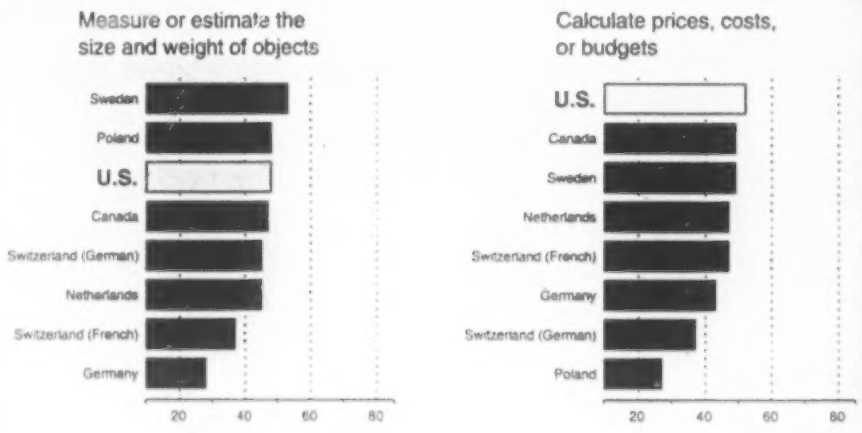
In some countries there is little difference reported among those at Levels 2, 3, and 4/5 on writing estimates and on working on bills and invoices. In contrast, in all surveyed countries respondents at Level 4/5 are considerably more likely than those at Level 2 to write letters and memos; they are also somewhat more likely to write reports and articles. As the task becomes more complex there is a stronger relationship between frequency and literacy level.

As was the case with the reading tasks, there are differences among occupations in writing frequency. Professionals and managers, technicians, and clerks reported the most frequent use of a variety of tasks. Notably, clerks are more likely than any of the other occupations to process bills or invoices; and service workers reported as much use of these kinds of tasks as professionals/managers and technicians.

Figure 4. Proportion of Population in Each Country Who Reported Engaging in Each of Two Workplace Numeracy Tasks at Least Once a Week



Mathematics. IALS respondents were asked to report how often they engaged in two workplace numeracy tasks — measuring or estimating the size and weight of objects and calculating prices, costs, or budgets. The overall frequencies for each country are shown in Figure 4.

There are some interesting correlational differences between these two activities. Level 1 respondents reported using measurement math more often than budget math, though the overall frequencies of the two types of math are similar in most of the countries. Correspondingly, those at Level 4/5 reported using budget math more frequently than measurement math. The proportions for the two sets of math tasks are almost identical in both Level 2 and Level 3, although higher frequencies were uniformly reported for Level 3, compared with Level 2.

Clerks and service workers, as might be expected, reported using budget math more frequently. On the other hand, skilled craft workers, machine operators, and agricultural workers reported using measurement math more frequently. Technicians and professionals and managers reported similar frequencies for the two types of math.

Literacy in the Community

Literacy activities. Much literacy activity takes place outside the workplace. The IALS asked respondents a variety of questions about their everyday literacy practices and their participation in other social and community activities — news paper reading, book and magazine reading, letter writing, and library use. The overall frequencies are shown in Figure 5[1].

[1] The overall frequency data are from unpublished computer runs conducted by Educational Testing Service.

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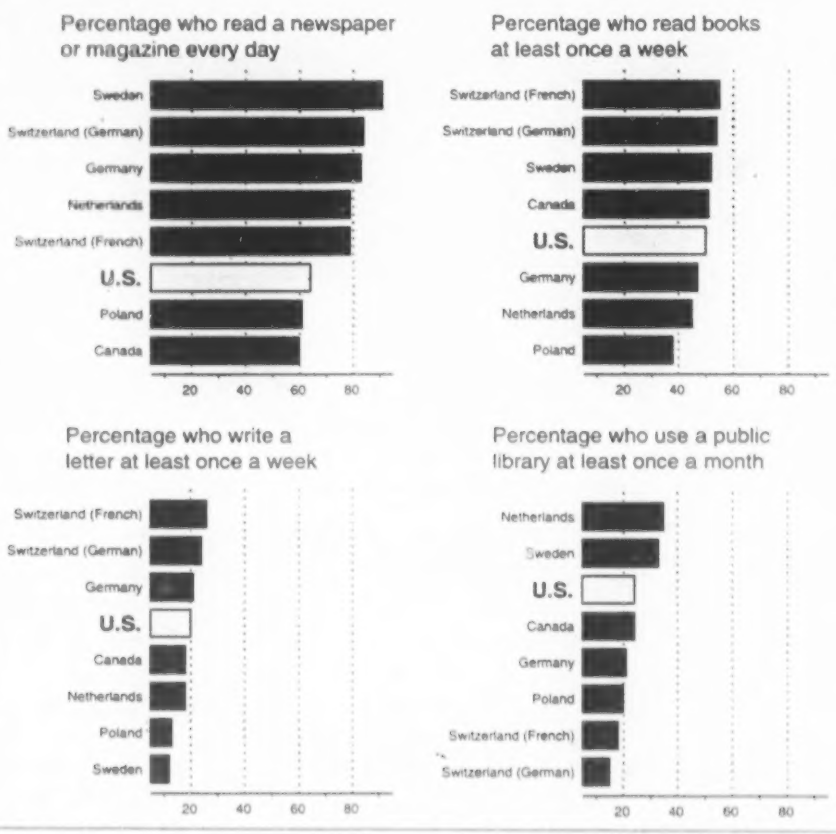
Figure 5. Proportion of Population in Each Country Who Reported Engaging in Various Literacy Activities



Daily newspaper or magazine reading is fairly common in all of the surveyed countries, although less so in countries with large numbers of second-language speakers (Canada, the United States, and Switzerland). Literacy level has only a small effect on newspaper and magazine reading, probably because this task covers a broad range of skills.

Less common are literacy activities that might be thought of as less functional, or "more literate," than reading newspapers. Fifty-five percent or less of the respondents in all participating countries reported reading books at least once a week. Reading books has a strong effect on the level of literacy. Uniformly, more of those at Level 4/5 reported reading books at least once a week, with smaller numbers at each lower literacy level.

There are small differences in letter writing across the participating countries, with the exceptions of Poland and Sweden, who lag behind. At the same time, there are significant differences across literacy levels for all frequencies of letter writing.

One-third or fewer of each country's respondents said that they visited a library at least once a month. The IALS data suggest that the libraries are serving the segment of the population who are already highly skilled. In all countries, individuals at Level 4/5 were most likely to report frequent library visits, although in the Netherlands those at Level 3 reported using the library at almost the same frequency as those at Level 4/5.

Overall, adults in those countries where the average scores are the highest (notably Sweden and the Netherlands) also reported the greatest use of literacy-related tasks, and those in countries with the lowest scores reported the least use.

Activities related to literacy. The IALS examined a number of other practices that, while not direct evidence of literacy, were widely thought to be associated with it, or with its absence. Figure 6 shows the overall frequencies for television watching and community participation.[2]

[2]The data on overall frequencies are from unpublished computer runs conducted by Educational Testing Service.

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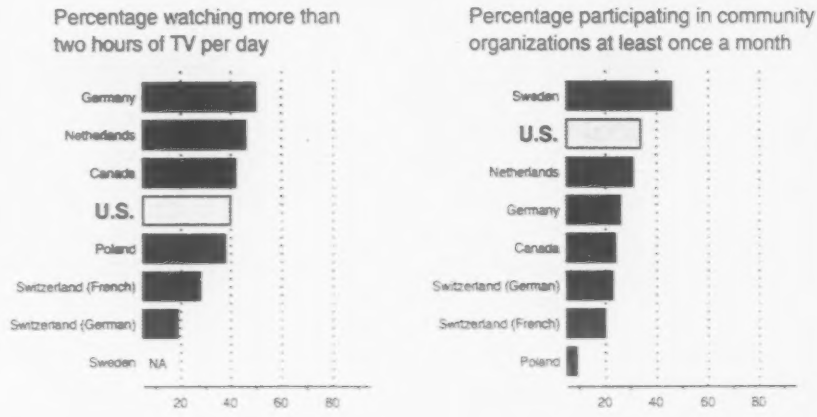
The data provide support for the widespread public belief that television watching and literacy are somehow incompatible, although the relationship is complex. The IALS data demonstrate a noticeable — and negative — link between the two. Those most likely to watch television for significant periods of time are usually at lower literacy levels. About half of the respondents in Germany and the Netherlands reported watching television more than two hours per day.

There are also considerable differences in community participation across countries. Almost half of Sweden's respondents reported participating in a community organization at least once a month, compared to only 9 percent in Poland. While there are some country-to-country differences in how literacy relates to community participation, in all cases individuals in Level 1 are less likely to participate in community organizations.

Figure 6. Proportion of Population in Each Country Who Reported Engaging in Various Literacy Activities



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Conclusions

The IALS has broken new ground in the understanding of literacy, its distribution, and its implications. When the project was conceived in 1991, there were reservations about the potential for comparing literacy proficiency across languages and cultures. In practice, the richness and validity of the data obtained exceeded even the expectations of the project's most enthusiastic supporters.

The information provided here and in the IALS report have made only a start in interpreting the IALS data. The main work of interpretation and application will need to be carried out within each of the participating countries. Some conclusions can already be drawn. The most important findings follow.

- ***Important differences in literacy skills do exist across and within nations***. These differences are large enough to matter both socially and economically. They concern not only the overall levels of literacy skill in particular countries, but also the distribution of those levels. In some IALS countries, most of the population clusters into a relatively narrow band of proficiency; in others, there is a wide range of difference between adults with low and high levels of literacy.

- ***Literacy skill deficits are found not just among marginalized groups, but affect large proportions of the entire adult population***. Over half of adults in some countries fail to move beyond the two basic levels (Levels 1 and 2) of literacy. There is a need to consider methods for improving the skills of entire populations as well as seeking remedial measures for selected groups.

- ***Literacy is strongly associated with life chances and use of opportunities***. While the processes that lead to this result are certainly complex, there can be no doubt about its importance to employment stability, the incidence of unemployment, and income. Moreover, in most countries the structural adjustment that is reducing the economic prospects of adults with low literacy skills is far from complete. Therefore, those with low literacy levels will have even fewer opportunities in the future.

- ***Literacy is not synonymous with educational attainment***. Not surprisingly, people with more education tend, on average, to have higher literacy levels. But the length of initial schooling and further education is shown to be only one factor contributing to literacy in adulthood — in two ways. First, in every country there are many cases of poorly educated people who perform well on the literacy scales, and a smaller but still significant number of highly educated people who perform poorly on the literacy scales. The implication is that although formal education yields an immense advantage, it is also possible for individuals to improve their literacy through their own efforts and behavior. Second, there are considerable differences between countries in terms of the likelihood that someone with a particular quantity of education will perform at a particular level. The implication is that schooling provides no more than a "start in life" when it comes to acquiring literacy skills, and it appears to provide a more effective start in some countries than in others.

- ***Literacy skills, like muscles, are maintained and strengthened through regular use***. Formal education systems provide only the raw material for adult literacy. The evidence shows that the lack of application of literacy in daily activities is associated with lower levels of performance. Some supportive contexts at home and at work seem to reinforce literacy practices

and applications better than others. One reason for optimism is that some areas of high employment growth in OECD countries, such as financial and other service sectors, tend to create environments that reinforce literacy. Others, such as manufacturing, may become better at doing so through restructuring. But the transition to information-based economies is not a smooth one, and a strong effort will be needed to ensure that literacy practices are improved within organizations of all kinds. The creation of environments that favor lifelong learning will require strong commitment from individuals, employers, and governments.

- ***Adults with low literacy levels do not usually acknowledge or recognize they have a problem.*** Survey participants at all literacy levels, when asked whether their reading skills were sufficient to meet their everyday needs, replied overwhelmingly that they were. For those designing programs to reduce the dependence of individuals with low literacy levels on others, this denial has important implications.

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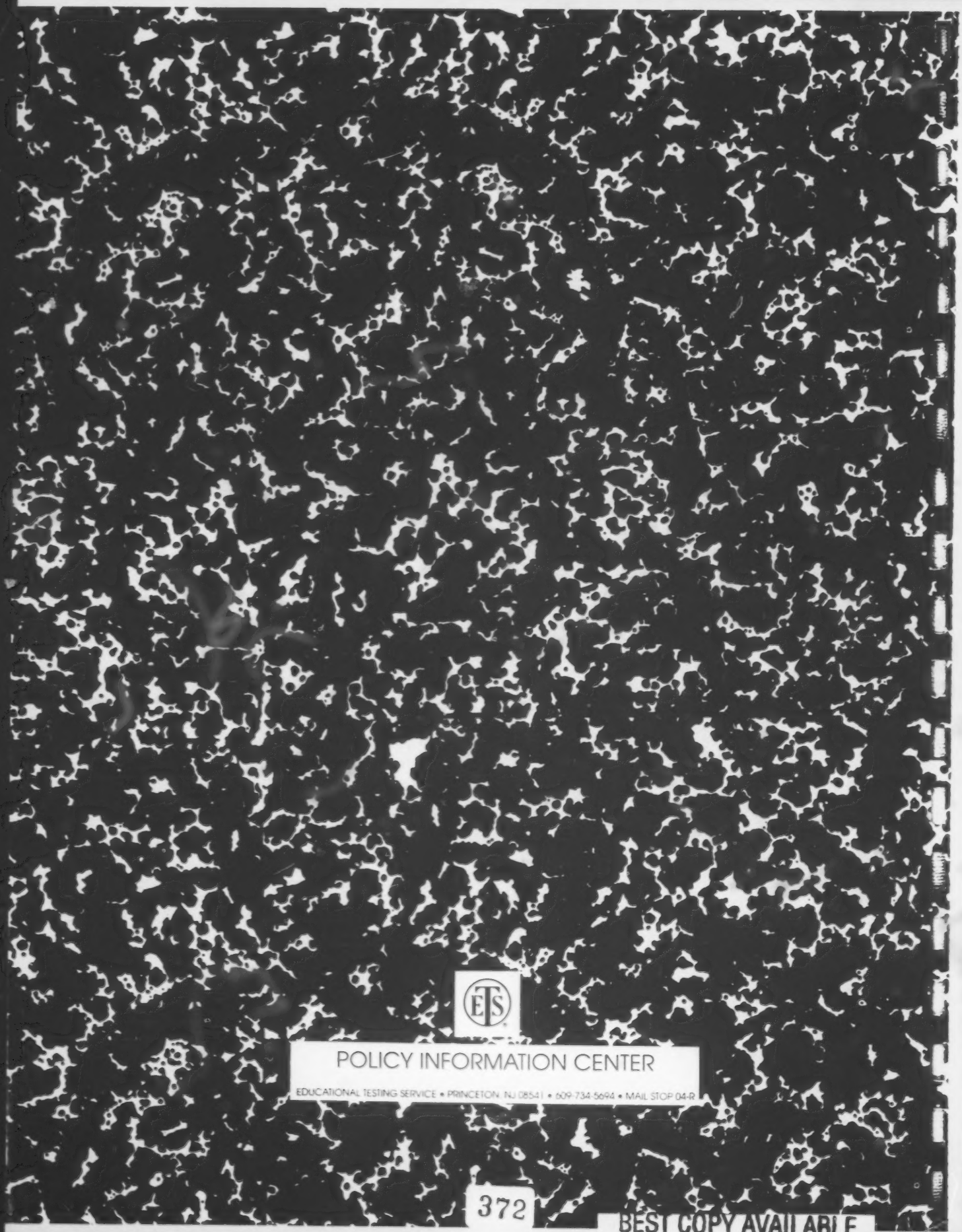

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